Connecting Cleveland:
Connecting Downtown and its Neighborhoods
Through the Creation of a Bicycle and Pedestrian Trail Loop

An Honors Thesis (LA 404)

By

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Signed

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Abstract

Throughout history, urban core has constantly changed to meet the needs of those who lived and worked in these economic centers. During the mid-twentieth century, these urban zones were typically utilized for only business transactions, causing these centers to evolve around the automobile as this served as the primary mode of transportation for the daily commute. While this trend was sustained for several decades, young professionals have begun to recognize the value of the downtown region, causing these areas to adjust to the live, work, and play model. For this reason, the increase in pedestrian, bicycle, and alternative transportation traffic is causing a strain on current streetscape configurations, forcing designers to alter urban roadways to accommodate for future projected growth.

This comprehensive project examines the challenges and process of creating an urban bicycle and pedestrian trail loop in the City of Cleveland, Ohio and the numerous benefits this amenity can provide this community's residents and visitors. As the city continues to evolve and further develop, the importance of connecting people with the surrounding neighborhoods, districts, and landmarks will continue to drastically increase. This will help to build a greater sense of community and grant access to local amenities via an enhanced and developed alternative transportation system.

In addition to building local connections, this project attempts to enhance recreational, health, and the economic benefits this system can provide while simultaneously enhancing overall cycling safety in the urban right-of-way. By implementing various urban and streetscape design guidelines, this amenity will be able to develop into a full network system that can be utilized by a wide range of users for a variety of personal benefits. At the local level, success of this project will help spur economic development and interest of the urban lifestyle in the City of Cleveland, allowing the city to continue to reinvent its image in a post-industrial society. Additionally, upon completion of this research, this system has the potential to serve as a model for future urban design and landscape planning within similar situated cities in the United States.

Acknowledgements

I first want to thank my parents, Jeff and Chris, and my brother, Steve for their constant support, prayers, and encouragement throughout this project and my college education. I would not be where I am today without you and I hope to continue to make you proud in my future endeavors.

Second, I want to thank the professors of the Landscape Architecture Department at Ball State University for their guidance throughout my educational career. I would specifically like to thank my advisor, Ann Hildner for her insight and guidance during this project. I would also like to recognize Professors John Motloch and Peter Ellery, the instructors of the comprehensive project studio.

Lastly, I would like to thank the members of the City of Cleveland Planning Commission staff for providing me with a valuable internship experience prior to my fifth-year of study. My experiences gained while working with you inspired this project and has helped to further foster my interests in urban spaces, trails, and transportation.

Author's Statement

Since the early 1900s, the automobile has served as the primary mode of transportation, causing each of our cities to expand, sprawl, and develop around this system. Initially, this new found mobility inspired greater freedom when concerning the live, work, and play model; however, this mass exodus of people from the downtown core would ultimately have a detrimental effect on our urban landscape. Rather than serving as places that could support a complete lifestyle, urban centers continued to develop around the automobile, as this was the primary method people used for their daily commute from suburban life.

In recent years, planners, designers, and young professions have recognized the importance of the urban landscape, inspiring many of these individuals to begin reinventing the city from its previous automobile-dependent model. This, combined with keen awareness towards recreational benefits, health improvement, safety awareness, and economic development has put a greater emphasis on altering the urban right-of-way from a solely motorist inspired infrastructure, to a shared automobile and bicycle network system. While this can come with opposition, research and case studies have demonstrated an improved overall quality of life due to the implementation of urban bicycle and pedestrian trails.

As with many cities, a renewed interest in the live, work, and play model has led many young professionals to move to Downtown Cleveland in search of this desired lifestyle. Recent downtown population growth and an increased awareness toward alternative transportation needs have caused local designers and planners to reconsider the infrastructure the urban street. Members of the Cleveland Planning Commission have expressed interest and commitment to expanding bicycle infrastructure in the downtown core and throughout the city. To date, several initiatives and projects have been proposed to promote a cycling culture; however, these plans fall short of creating a holistic bicycle trail plan.

The issue of redesigning the urban street to accommodate for a variety of users has recently become a prominent topic in the field of landscape architecture. As urban populations continue to increase, this topic will only become more prevalent. By using the City of Cleveland as a project site, this thesis allows for the exploration of these issues through creation an enhanced bicycle network.

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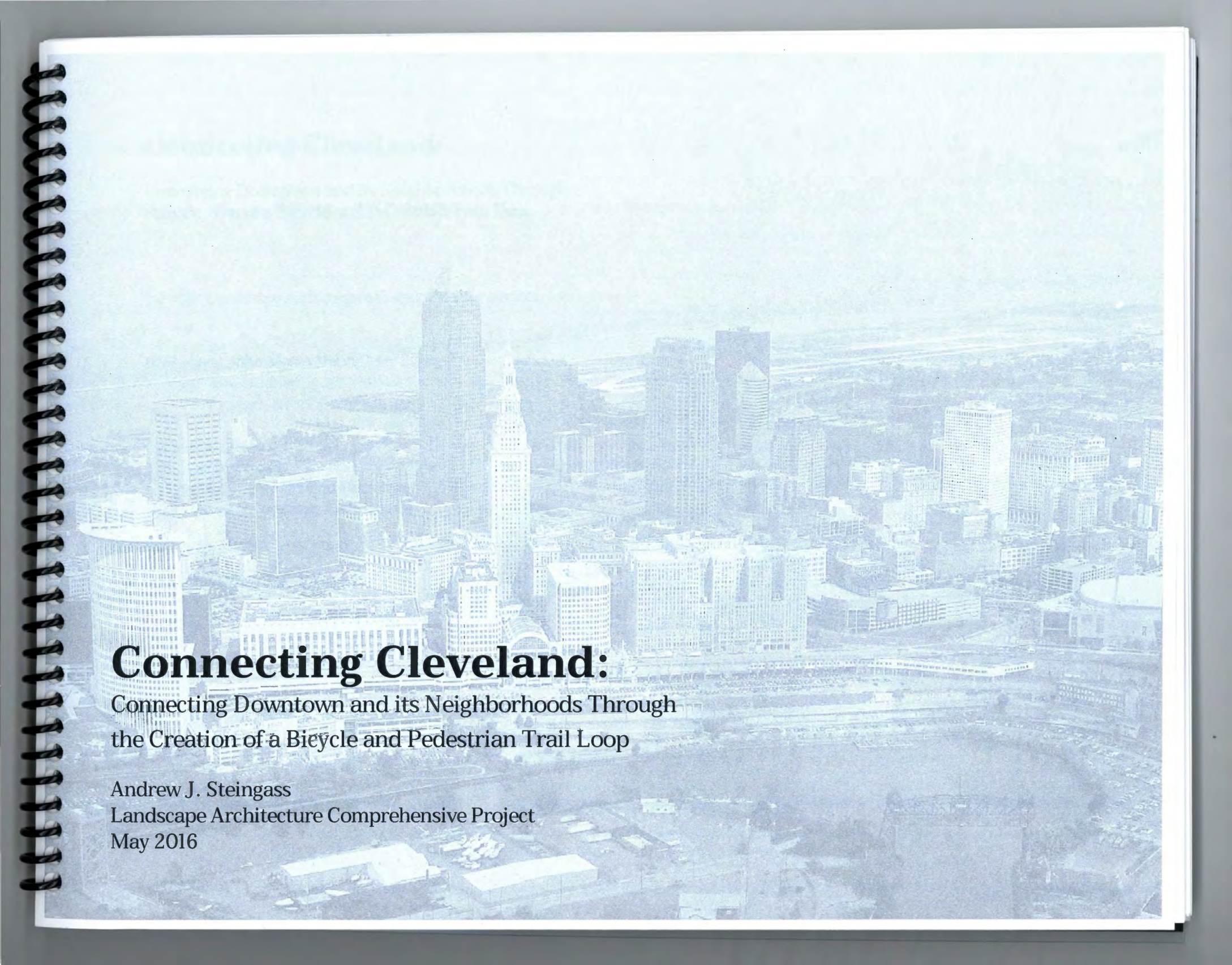

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Andrew J. Steingass
Landscape Architecture Comprehensive Project
May 2016

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LA 404: Landscape Architecture Comprehensive Project

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In addition to building local connections, this project attempts to enhance recreational, health, and the economic benefits this system can provide while simultaneously enhancing overall cycling safety in the urban right-of-way. By implementing various urban and streetscape design guidelines, this amenity will be able to develop into a full network system that can be utilized by a wide range of users for a variety of personal benefits. At the local level, success of this project will help spur economic development and interest of the urban lifestyle in the City of Cleveland, allowing the city to continue to reinvent its image in a post-industrial society. Additionally, upon completion of this research, this system has the potential to serve as a model for future urban design and landscape planning within similar situated cities in the United States.

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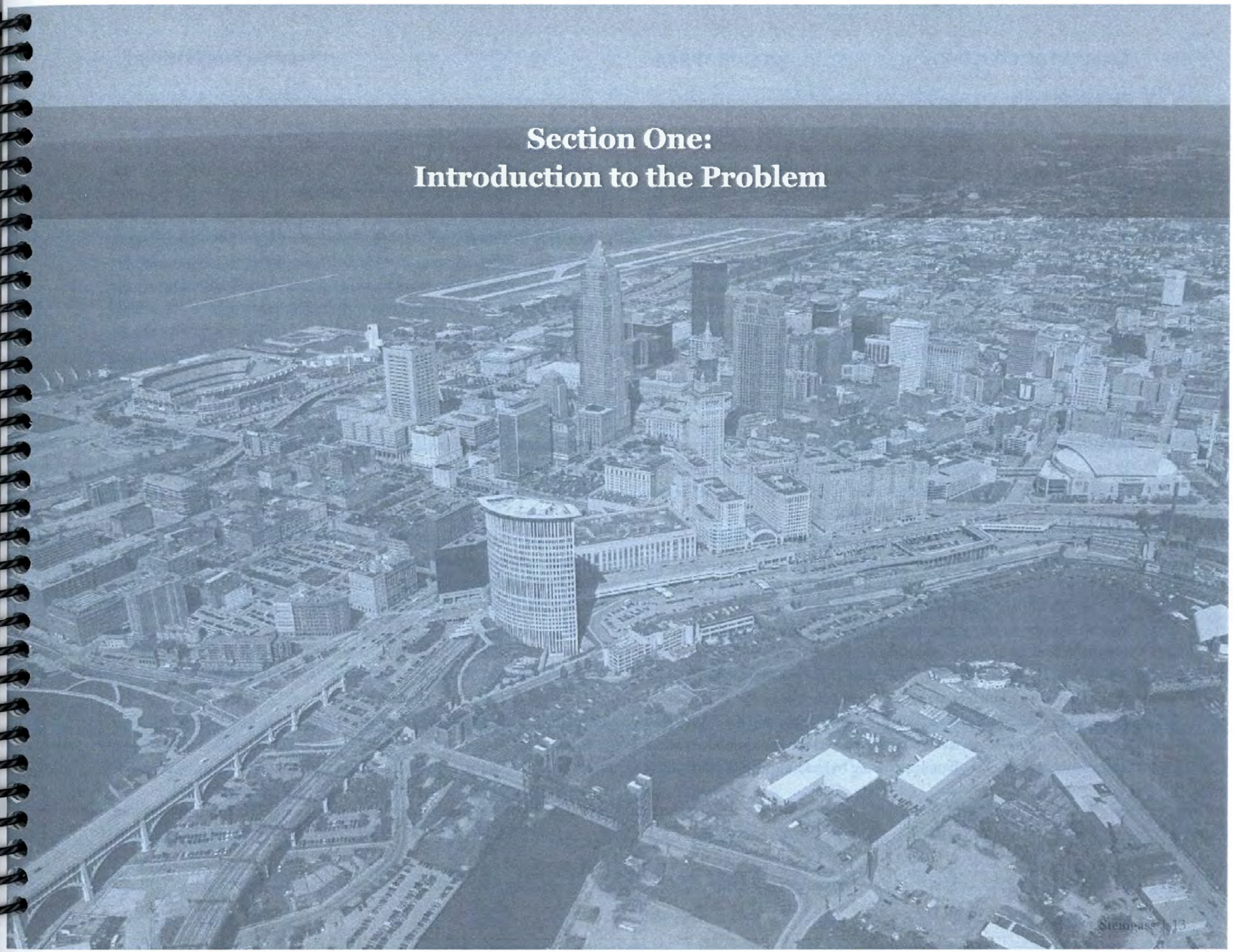
Section One:
Introduction to the Problem



Project Introduction

Since the early 1900s, the automobile has served as the primary mode of transportation, causing each of our cities to expand, sprawl, and develop around this system. Initially, this new found mobility inspired greater freedom when concerning the live, work, and play model; however, this mass exodus of people from the downtown core would ultimately have a detrimental effect on our urban landscape. Rather than serving as places that could support a complete lifestyle, urban centers continued to develop around the automobile, as this was the primary method people used for their daily commute from suburban life.

In recent years, planners, designers, and young professions have recognized the importance of the urban landscape, inspiring many of these individuals to begin reinventing the city from its previous automobile-dependent model. This, combined with keen awareness towards recreational benefits, health improvement, safety awareness, and economic development has put a greater emphasis on altering the urban right-of-way from a solely motorist inspired infrastructure, to a shared automobile and bicycle network system. While this can come with opposition, research and case studies have demonstrated an improved overall quality of life due to the implementation of urban bicycle and pedestrian trails.

The economic and social trends of the City of Cleveland, Ohio are typical of many rust belt cities and of the trends briefly discussed above. Originally built and developed around an industrial and shipping economy, Cleveland was viewed by many as a place of opportunity throughout much of the late nineteenth and early twentieth century. This allowed for a steady growth in population for city until approximately 1950. As city conditions began to rapidly deteriorate and the automobile became a household commodity, families decided to leave the city in search for a new life in the suburbs or rural communities. As a result, the downtown core became a place of only work, as compared to a place in one would live, work and play.

As with many cities, a renewed interest in the live, work, and play model has led many young professionals to move to the Downtown Cleveland in search of this desired lifestyle. Recent downtown population growth and an increased awareness toward alternative transportation needs have caused local designers and planners to reconsider the infrastructure the urban street. Several initiatives and projects have been proposed to promote a cycling culture; however, these plans fall short of creating a holistic bicycle trail plan.

The outcome of this comprehensive project aims to develop an urban bicycle and pedestrian trail loop network system for the City of Cleveland; an urban center that has faced many of the hardships similar to that of a post-industrial economy. This plan aims to reconnect users with the urban core and with many of the amenities the downtown community has to offer. Additionally this project aims to offer recreational activities and improve right-of-way safety, two areas of concern that have been lacking within the downtown neighborhood. Overall, this design helps to develop potential design guidelines and solutions that can direct further alternative transportation development in the City of Cleveland and other similarly afflicted communities. The amenities this service provides helps to increase the over quality of life for those who live and work in the downtown districts, neighborhoods, and communities.

The Problem Statement

This comprehensive project focuses on the development of an urban pedestrian and bicycle trail loop system that creates connections, recreational opportunities, and health benefits for those who live, work, and visit Downtown Cleveland and its surrounding neighborhoods. Additionally, this study serves as a catalyst for economic development in areas connected to the trail and helps improve overall cyclist and pedestrian safety in the corridors impacted by this trail. By assessing alternative transportation needs, this study helps to determine potential design alternatives for a safe urban pedestrian and bicycle trail loop, allowing new community connections to occur between the downtown districts and the surrounding neighborhoods.

Sub-Problems and Questions

- How can an urban pedestrian and bicycle trail effectively connect the downtown districts with the surrounding neighborhoods, the waterfront, and surrounding trails?
- How can an alternative transportation network provide additional recreational opportunities for those who live and work in the downtown area? What health benefits can this trail provide?
- How can an urban pedestrian and bicycle cultural trail be used as a catalyst for economic development in the City of Cleveland?
- What type of pedestrian and bicycle trail is needed for the downtown districts? Who are the primary users of this trail? What types of features are needed to promote and ensure user safety?

Assumptions

- Population growth trends in the Downtown Cleveland districts will continue at the same rate over the next decade, reinforcing the need for an urban bicycle and pedestrian trail loop.
- Features located in the right-of-way that have been classified as historically or culturally significant will be preserved whenever possible.
- Land located in the current right-of-way will only be considered for the development of this bicycle and pedestrian trail loop regardless of potentially available adjacent properties.
- Buildings or permanent structures located within the right-of-way will be taken into consideration in the development of the bicycle and pedestrian trail loop. These structures will remain in place throughout the duration of the project and will be accommodated for to minimize potential trail interference.
- Connections to current trail systems and proposed trail systems will considered during the course of this project. Development, implementation, and construction of these systems are assumed to progress as planned and on the stated time schedule.
- While not discussed in this review, ADA guidelines for the trail design will be followed in order to promote user accessibility in the trail network.
- All federal, state, and local regulations will be observed when reconfiguring roadways in order to insert and develop appropriate bicycle infrastructure.

Delimitations

- Public need will be discussed in this project; however, individual public input from those who live and work in the downtown districts and the surrounding neighborhoods will not be collected.

- While funding is an essential aspect to any development project, this study will not be constrained by cost estimations or access to theoretical sources of funding.

- A portion of this project will discuss and address the need for an enhanced bicycle and pedestrian trail plan that extends throughout the city and beyond the downtown core. While this is an important concept, these areas where not located strictly within the focus area and therefore only resulted in the creation of conceptual plans for the explanation of these connectivity ideas.

- While the inclusion a bicycle and pedestrian trail loop can often drastically alter the fabric of the urban right-of-way, this project does not include design elements for every aspect of the altered streets. This project only includes designs for areas needing to be altered, or dieted for the inclusion and construction of the proposed urban trail. Areas not needing to be altered will remain in their current form.

- Although the positive aspects of the proposed bicycle and pedestrian trail loop have the potential to reach far throughout the downtown core, this study will not explore design strategies to enhance neighborhood connectivity, recreation and wellness, economic development, or safety for areas farther than one block from the bicycle and pedestrian trail access point.

Statement of Significance

As the City of Cleveland continuous to reinvent itself, the need for a developed alternative transportation plan steadily increases. In recent years, Cleveland has developed the HealthLine, a bus-rapid transit system that connects Public Square, Cleveland State University, University Circle, and East Cleveland. While this is a great improvement to alternative transportation, a safe, connective, and effective bicycle transportation system continues to remain underdeveloped in the downtown districts. This disconnect in regards to the lack of an adequate bicycle trial can also be seen in other aspects of the city as well. For example, many of the downtown districts can be seen as "islands" with highly underutilized space between them. Additionally, in the downtown area, it is difficult for pedestrians and bicyclists to access the lakefront and riverfront as it is often unsafe for these two groups to reach it. Opening up these areas to the community would improve recreational opportunities in the urban core and bring health benefits to those would partake in this potential opportunity, while simultaneously improving safety and connections for these two user groups.

In addition to enhancing alternative transportation infrastructure to serve a growing population, the economic implications trail development brings is also highly desirable for those who wish to live according to the live, work, and play model. Several case studies have shown that trail development has the ability to drastically increase revenue and economic activity for businesses located along or near the urban trail. This can primarily be contributed to an increase in non-vehicular along the corridor. As previously stated, many of the downtown districts within the City of Cleveland can often be seen as "islands" with highly underutilized or neglected properties between them, leading to an overall disconnect from one attraction to another. The potential foot-traffic this downtown trail could provide would allow for the economic development of these underutilized zones along and within the loop itself. This allows for a diversity of user experiences in the downtown core, increasing the overall economic potential of the City of Cleveland.

Review of Literature

Introduction

Over the past century, the automobile has served as the primary mode of transportation, causing each of our cities to develop around this system. In addition to forming the standard layout of these urban centers, the automobile has also allowed for rapid suburban sprawl, causing a departure from these localized areas, and lessening the livability and community within these districts. As cities continue to alter the fabric of the metropolitan corridor in order to promote enhanced civic activity, the topic of urban bicycle and pedestrian trails continues to gain prominence as a potential solution to some of the issues the urban core faces. This literature review focuses on several of the topics and challenges landscape architects and planners face in designing and implementing and urban bicycle and pedestrian trail. These topics include: place and trail connectivity, recreational value and health benefits, economic development, user safety, and streetscape features. Each of these sources and case studies represents a body of knowledge and a variety of projects that are essential to creating an urban bicycle and pedestrian trail loop for Downtown Cleveland and its surrounding neighborhoods.

Place and Trail Connectivity

As with most urban centers, the City of Cleveland is comprised of several districts and surrounding neighborhoods that each have a unique identity or purpose. However; all too often, these zones are not clearly defined, creating greatly under-utilized transitional spaces among 'islands' of vibrant activity. In many respects, the key to enhancing these transitions is to strengthen the overall function of these transitional zones. According to Vikas Mehta, the success of the urban corridor is often attributed to the sociability of the street (181). As compared to the lively, social streets of Eastern countries, Western culture often masks activity and sociability behind buildings rather than within the public realm (Mehta 185). To combat this phenomenon, designers, planners, and businesses must take a progressive approach to create a street that promotes public gathering and multiple levels of activity (Mehta 192-193). This activity inclusion approach can in part be achieved through the increased presence of individuals, primarily pedestrians and cyclists, in the urban right of way. By promoting this alternative transportation mode in the urban corridor, the former transitional space can be utilized as a vibrant commercial zone (Mehta 191). By including a safe, separated pedestrian and cycling trail in the core, a larger array of individuals will also be attracted to the activity, increasing the overall sociability to the once neglected transitional zone (National Association of City Transportation Officials 43).

While many individuals will simply use trails as a form of social event, it is important to note that many individuals depend on walking or the use of bicycles to meet their basic needs. Mary Soderstrom, a critic of the car-dependent lifestyle, details the difficulty in searching for a home that allowed for an easy walk to work and the other amenities her family would need (13). While the search for a home that fits these qualifications proved difficult for this family today, the author also notes that historically city residents had to depend on non-motorized transportation forms prior to 1800 (Soderstrom 14). Similar opinions were also voiced by Colville-Anderson, suggesting history may provide clues to the infrastructure dilemma.

In addition to urban design guidelines and historical precedence, recent case studies have demonstrated that trails can be utilized as the tissue that connects neighborhoods and people to the urban core. A former rails-to-trails project in Dallas, Texas, the Katy Trail serves as a linear park for the community while simultaneously connecting 20 neighborhoods and the individuals that reside in them to the urban center (Ying-Yu, et. al. 128). This allows individuals to effectively use cycling as a reliable means of transportation when moving between the neighborhoods and districts. Additionally, this trail also connects with DART (Dallas Area Rapid Transit) stations in order to further promote a cycling and alternative transportation culture (Ying-Yu, et. al. 128). Furthermore, the heavy use of the corridor continues to reinforce this trail's success

in providing an alternative connective option between the different communities and centers in the Dallas area. Many of these findings have been further explored and are prevalent in other alternative transportation corridors throughout the country. Another instance in which this concept is prevalent is in the Atlanta BeltLine. In this study, an emphasis on improving the bicycle and pedestrian realm allows for more compact development, enhancing the overall sociability of the space and fostering a greater sense of community ("The Blueprint for the Atlanta BeltLine.").

At the local level, the Towpath Trail and Greenway Extension Project has showcased the ability to connect several diverse zones within the City of Cleveland and its surrounding communities (Figure 1.01). By connecting Steelyard Commons, the Flats, Whisky Island, and the lakefront, this trail aims to connect several different features in a sequence that had previously been inaccessible not only to non-motorists, but automobiles as well (Cuyahoga County Planning Commission).

The idea of using trails as a means to creating connectivity and increasing sociability are crucial to this comprehensive project and the design of the bicycle and pedestrian trail loop. When trying to determine a location for the trail loop, it is important to note current local, regional, and tourist destinations throughout the city, as these places are the present locations users are likely to visit. With these landmarks serving as the primary focal points, it will allow trail and urban development to occur between these destinations, as users will need to utilize these former "dead zones" in order to reach their final destination. This increased sociability will allow for new connective opportunity to occur between the downtown destinations, and allow for the connections of various isolated communities through the impacted regions.

Recreational Value and Health Benefits

The increased concern and emphasis on improving societal health and well-being has allowed the topic of diverse and flexible recreation to gain prominence in programmatic and design discussions. Since the layout of the urban core has historically been driven by commerce, many of these densely populated districts lack the adequate and flexible outdoor recreational spaces the wellness community desires (Unite for Sight). As cities begin to reinvent themselves and alter the function of the urban right-of-way, it is important to consider the inclusion of recreational aspects that former urban planning and design did not provide. Recent literature and case studies indicate that trail networks can serve a vital role in filling the recreational and wellness needs of those who live and work in the urban core and immediate surrounding neighborhoods. These bicycle and pedestrian trail networks can accommodate a variety of health related activities to occur, enhancing the wellness aspects in the urban corridor.

Recent studies into trail use patterns, especially inquiries in regards to health-driven urban and metropolitan trail users, can help formulate future standards for trail design by observing current programmatic and usage trends. A publication by Paul H. Gobster examines the diverse purposes a trail in Chicago's Warren Park served its visitors (370). As with many multi-use trails, this study noted that a majority of visitors were motivated to use the linear space for "pleasure-recreation" or "health-physical training". Additionally, the flexible programmatic function of the space directly corresponded to the motivated use of the trail (Gobster 374-375). This demonstrates the importance of flexibility in trail design as the activity type is primarily influenced by fitness motivation and recreational awareness of the user involved. While this trail and survey location were not located in the streetscape setting, the actions observed directly correspond with traditional urban trail activities, allowing the data to also apply in the urban corridor.

Based on several research findings, an urban trail must adhere to several design standards in order to accommodate a flexible recreational agenda. When concerning city trails and trails in the urban core, trail width must be considered in order to accommodate potential high volumes of non-motorized traffic. In Minnesota, recommended trail widths for separated, two-way city and urban trails fluctuate between ten and twelve feet, depending on the projected used of the trail (Figure 1.02) (Minnesota Department of Natural Resources 5.3). However, not all

trails need to abide by these standards. If space allows, trails can be further separated by use, limiting potential conflict between pedestrians, cyclists, skaters, and other users. These separated use trails contain different standards in order to accommodate more for the needs of the activity and improve the perceived safety of the space. (Minnesota Department of Natural Resources 5.2). These guidelines are also reflected by the National Association of City Transportation Officials when concerning national standards for separated two-way cycle tracks. In addition to mandated trail widths, characteristics such as signage, symbology, and traffic controls help to further clarify trail use, allowing a diverse and flexible array of activities to occur (Figure 1.03) (62-63). Many of these guidelines, including separated use trails, can be observed in sections of the Indianapolis Cultural Trail (Figure 1.04) (National Association of City Transportation Officials 62). Failure to abide by these design guidelines can jeopardize the success of the urban trail by limiting the number of diverse activities and the number of individuals that can utilize the trail at any given time.

The success of enhancing recreational opportunities though urban trail initiatives can be observed in several cities throughout North America. In a rails-to-trails initiative in Dallas, Texas, the Katy Trail provides city residents with diverse recreational opportunities while also connecting individuals to neighborhoods and city centers (Figure 1.05). This path utilizes a separated trail system to divide high intensity activities from passive recreational events, diminishing the perceived threat to safety and enhancing the ability to partake in diverse opportunities (Hung, Ying-Yu, et. al. 128-129). Additionally, this space has the ability to host a walk/run event, further demonstrating the flexibility and success of the space (Hung, Ying-Yu, et. al. 135). In another publication, the Centers for Disease Control and Prevention calculated that by altering streetscape design policies and by providing recreational opportunities, there was an observed 35% increase in physical activity based on six research studies (29). In this report, it was discussed that the City of Toronto specifically has enhanced their bicycle infrastructure redesigning several urban streets to accommodate for 25 miles of new bicycle infrastructure. This has led to an overall 23% increase in bicycle use, thus allowing an increased fitness awareness to occur by those who utilize the system (Centers for

Figure 1.01: Scranton Flats Towpath Trail in Cleveland, Ohio

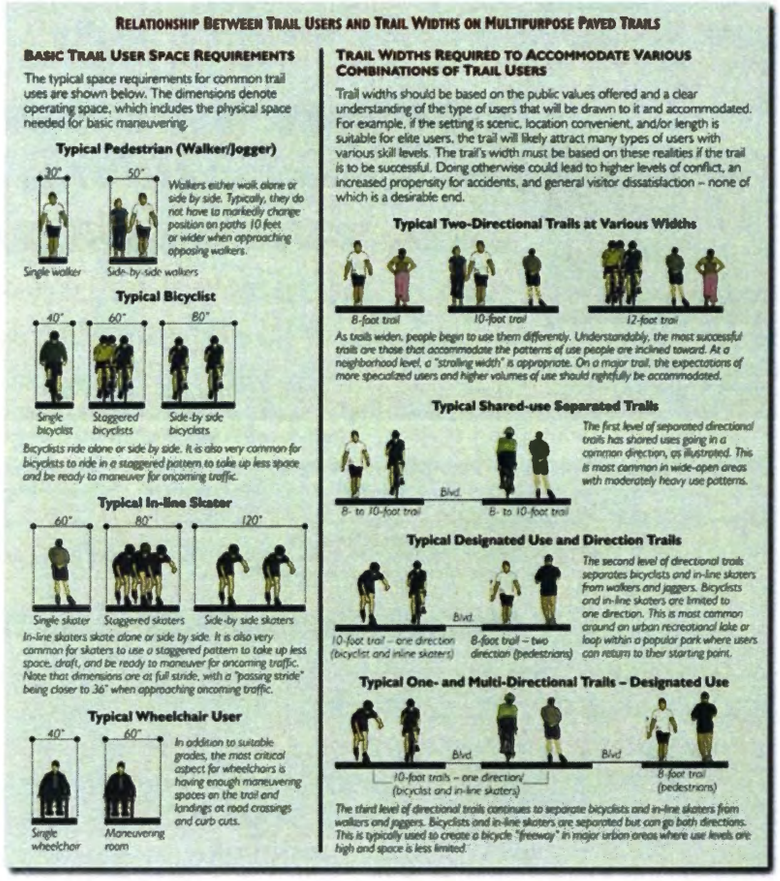


Figure 1.02: Relationship between Trail Users and Trail Widths on Multipurpose Trails

Disease Control and Prevention 30).

The primary motivation to increase the diversity of recreational opportunities in the urban core is to improve the personal health benefits of those who partake in activities that occur in these linear spaces. Trails that fail to accommodate several activities may indirectly exclude individuals who do not meet the unofficial age or fitness requirements required of those to utilize the space. As discussed by the BetterHealth Channel, cycling alone has several benefits that can enhance the quality of life for those who desire different heath improvements (Cycling - Health Benefits). Since different activities allow for different fitness outcomes, the diversity of recreational opportunities allows for each individual to utilize the trail in manner that will enhance their desired self-benefit.

The need for recreation flexibility is central to determining appropriate trail specifications for the design and layout of the bicycle and pedestrian trail loop. The chosen dimensions will need to accommodate a variety of users (bicyclists, pedestrians, in-line skaters, skateboarders, unicyclists, etc.) and allow for minimal interference between these various user groups. Additionally, each user group prefers different materiality and accommodations in order to have an optimum experience along the trail. These concepts and preferences will guide the design requirements for this comprehensive project and will determine various trail typologies that can be utilized within the urban right-of-way.

Economic Development

Historically, the success of the urban core had been determined by the measured economic prosperity of institutions, businesses, and those who own property or businesses central district. For this reason, project success is often measured by its contribution to economic development and the revitalization of those properties the project intersects. While urban economic development is often associated with gentrification or the addition of new business, this is not always the case. Recent literature and case studies have shown that the addition of an urban trail has the capability to drastically improve the urban economic condition of businesses and residents who parallel this alternative transportation form while revitalizing the area.

Since trails have the ability to increase foot and bicycle traffic within the urban right-or-way, the additional influx of people this linear space provides has the ability to increase economic activity in previously underutilized and neglected corridors (Rails-to-Trails Conservancy 2). These new connections allow individuals to shop, work, and live in the same localized community, a new reality that once had not been supported. In many respects, the economic development derived from trails can be seen as an adapted version of the transit-oriented development model. This emerging Trail-Oriented Development model is a method of combining trail transportation with revitalization possibilities through the use of designed public spaces, creating a holistic community (Rails-to-Trails Conservancy 2-3). The success of this trail implementation can especially be observed in Cumberland, Maryland. "'The revival of the city is driven, in part, by the trail,' says Mayor Lee Fiedler, who ordered bike racks installed on downtown street corners. 'No one thought people with bikes would spend money, but they were wrong. Business is spreading back from the trail'" (Thomson). Similar findings have also been found in a study regarding the Indianapolis Cultural Trail's economic impact. Local businesses, both new and old establishments, have reported an increase in customers and an increase in revenues since the construction of the cultural trail (Burrow and Majors 4). Additionally, this increase in revenue has allowed for the creation of approximately 100 full-time and part-time jobs (Burrow and Majors 5). When visitors to the trail were surveyed on what future developments they would like to see on the trail, the common response was more restaurants and shops (Burrow and Majors 7). This further demonstrates the economic impact this trail has on those businesses that intersect it. Each of these economic benefits allows for increased tax revenue that can be utilized in various manners throughout the City of Indianapolis (Burrow and Majors 4).

According to the case studies in Cumberland and Indianapolis, the increase in tourism the trail brought must also be considered when discussing the increase in customers and revenues. In Indianapolis, it was calculated that users of the cultural trail average expenditures were $53 with out-of-town individuals spending nearly $113 dollars on average,

a figure more than double the local average expenditure (Burrow and Majors 6). This mostly can be contributed to the increase in lodging revenue the hotel industry receives from out of town visitors.

In addition to increased revenue, recent literature had demonstrated that the presence of an urban bicycle and pedestrian trail has a positive impact on property values as well (Burrow and Majors 2). Often prior to building a pathway, homeowners fear that the trail will bring undesirable traffic near their property, diminishing the property value. This fear was experienced by homeowners in Pinellas County, Florida when it was proposed that the Pinellas County Trail was to be extended (Renaissance Planning Group 2-1). The report analyzed property values of homes on and off the trial prior to and after its construction. The report found that on average, homes immediately along the trail could be sold at a higher market rate and were more desirable than homes off the trail (Renaissance Planning Group 2-4). These findings are further verified by the case study in Indianapolis, which found that property values of businesses and homes within 500 feet of the trail had increased by approximately 148% over a seven year period (Burrow and Majors 1). Lastly, in Camden, New Jersey, a city that had experienced an urban collapse in industry, business, and residential property, the Cooper Greenway and trails have begun to spur economic development in properties along the proposed and newly constructed trials. While this project has yet to be finished at the time of publication, the mere prospect of a trial had increased the perceived value of the land. This also caused developers to begin to develop land along the corridor in an attempt to increase economic opportunity (Rastorfer).

According to Vikas Mehta, a key aspect to enhancing and advancing the commercial district is to design a sociable streetscape environment (181). The author argues that the key to enhancing sociability is to incorporate more activity on the street by improving the prominence of the person in the right-of-way (Mehta 185). The author precedes this argument by comparing Western street culture to the activity and sociability of street in Delhi, India (Figure 1.06) (Mehta 182-183). While drastic change between these two examples is extreme, the idea that sociability and the presence of the pedestrian can enhance the economic

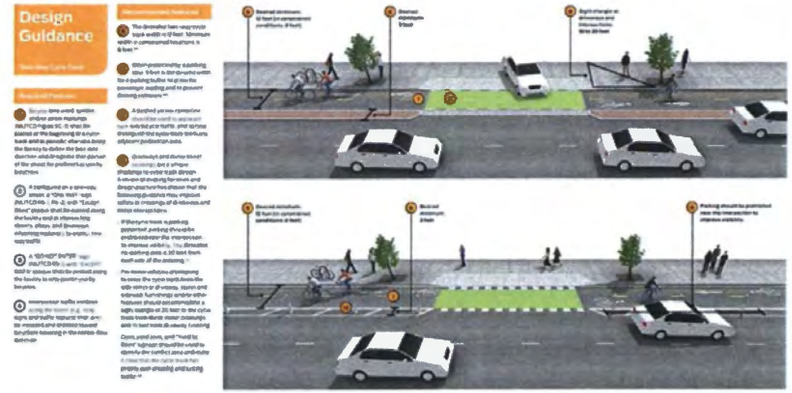


Figure 1.03: Design Guidance for Two-Way Cycle Tracks from NACTO

Figure 1.04: Indianapolis Cultural Trail

Figure 1.05: Katy Trail in Dallas Texas

qualities of a corridor is supported in other literature and case studies. As previously discussed, trail-oriented development has successfully stimulated economic progress for local businesses by enhancing pedestrian and bicycle access to businesses (Rails-to-Trails Conservancy 2). In Indianapolis, not only did businesses cite increased revenue due to the cultural trail; restaurants further stated they observed increased property value and business after enhancing their outdoor seating areas (Burrow and Majors 5). The inclusion of the trail and other outdoor activates adds several dimensions of sociability to the urban corridor, enhancing economic prosperity.

The economic implication trail development brings is highly desirable for those who wish to live according to the live, work, and play model. For this project to be economically successful, determining appropriate streets for the implementation of this trail is essential. Choosing locations that offer a mixture of highly-trafficked locations with under-utilized locations will allow economic stimulation to occur. This mixture of places allows for users to initially use the trail to reach present destinations, increasing the number of non-vehicular users in the urban right-of-way. This increase in foot-traffic will allow these highly-utilized zones to expand outward to the underutilized areas along the trail.

User Safety and Streetscape Features

Throughout the past century, engineers and planners have constructed and erected cities around an automobile dependent society; however, vehicular congestion, high oil prices, and a greater concern towards environmental impacts has caused many to consider using the bicycle as a common mode of transportation. This influx of riders in the urban corridor has jeopardized the traditional use of the street, often causing potentially dangerous situations when automobiles, cyclists, and pedestrians are forced to cross paths. According to Mikael Colville-Anderson, chief executive officer of Copenhagenize Design Company, these safety situations occur in many cities simply due to a lack of acceptable bicycle infrastructure. Additionally, cyclists "are forced to abide by a traffic culture and traffic laws that were invented to serve the automobile, a completely different transport form" (Colville-Anderson). As designers and planners attempt to alter the fabric of traditional urban infrastructure to accommodate the needs of a growing cycling population, it is essential to design a comprehensive network system that addresses the various safety concerns that arise when multiple transportation modes interact.

The physical threat to pedestrian and cyclist safety has been a topic widely investigated by traffic engineers and design professionals. While a majority of right-of-way fatalities and injuries are a result of automobile-to-automobile incidents, it is still essential to consider automobile-to-bicycle incidents and automobile-to-pedestrian incidents, as these statics could prevent a cycling culture from further expanding in urban centers. In general, statistics will vary from country to country and even from city to city; however, several studies indicate that there is a direct correlation between the car-to-pedestrian ratio and car-to-cyclist ratio. In her article, "The Safety of Walking and Cycling in Different Countries", Barbara Preston states that the number of pedestrians and cyclists killed each year in a given country can be directly attributed to a lesser number of automobiles on the roadway (49-51). For example, in 1984, the Netherlands, a country with a well-established bicycle infrastructure and therefore a lower number of automobiles, experienced the fewest number of cyclist casualties per million cycles as compared to other countries with a less defined infrastructure (51). This information is further reflected by the City of Delft, a local government that enacted policy that has successfully limited the number of motorists and increased the number of cyclists in order to create safer streets (Hartman 199). In the United States, similar measures can also be observed. Similar to policy enacted in Delft, the Seattle Bicycle Master Plan also promotes the limited use of automobiles by increasing the number of cyclists and pedestrians on the urban street (Seattle Department of Transportation). This increase in alternative transportation will allow continued motorist to gain awareness of cycling habits, thus limiting the number of casualties, lessening the amount of injuries, and helping to ensure the safety.

In order to adequately create a network system that addresses the various safety concerns associated with establishing an urban cycling culture, it

must be noted that the threat to one's well-being does not only include the physical, but rather, it includes the perceived threat and psychological as well. According to a study conducted by the Traffic Institute at Northwestern University, "most bicyclists (i.e., casual adult riders and kids) feel high levels of stress while riding on busy streets" (Institute of Transportation Engineers 1). This investigation demonstrates that despite bicycle and alternative transportation promotions, several demographics will hesitate to partake in these initiatives if the current urban infrastructure creates a stressful cycling experience, psychologically compromising their safety. Even though automobile-cyclists incidents are less common then automobile-automobile incidents, the uneven match between these two streetscape users creates a psychological safety issue that prevents many users from utilizing this transport method. If an urban bicycle network system is to succeed, these mental safety concerns must be accounted for.

The issues regarding pedestrian and cyclist safety has been recognized by many urban design and transportation officials, causing various solutions aimed at mitigating these problems to be reflected in streetscape feature design. Overall, current research advocates various forms of road diets and the inclusion of buffers to establish an adequate and safe bicycle infrastructure network (Figure 1.07). Each study addresses these issues in a different manner, at a variety of scales, and with a varying degree of resources. The Urban Bikeway Design Guide advocates the use of streetscape design to develop bicycle infrastructure through the use of bike lanes and cycle tracks at different degrees of resource availability. These guidelines can be used for projects that require minor modifications, such as stripping, or major enhancements that require the insertion of buffers, bollards, or planting material (National Association of City Transportation Officials 1-68). Additionally, the difficult nature of intersections is addressed in order to reduce the potential conflict between motorists and cyclists as traffic patterns alter. This publication focuses on the use of bike boxes (Figure 1.08), markings, through lanes (Figure 1.09), and refuge islands (Figure 1.10) in order to position cyclists in the optimal position for a street crossing (National Association of City Transportation Officials 69-126). In another publication, the Institute of Transportation Engineers details roadway modifications aimed at

Figure 1.06: Street Activity in Delhi, India

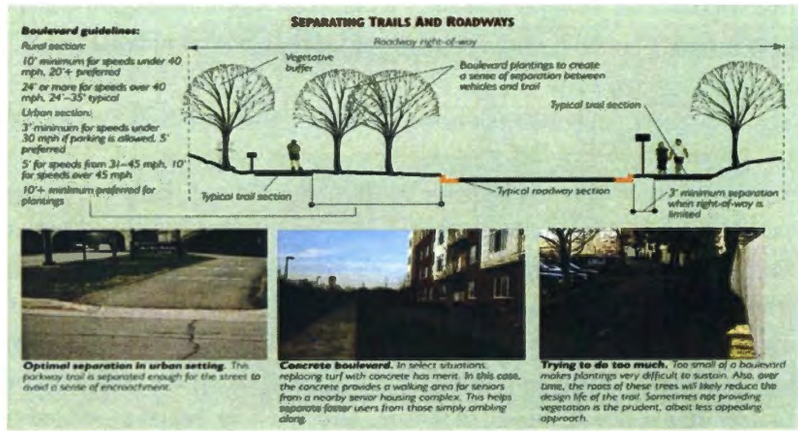


Figure 1.07: Trail Buffer Design Guidance

Figure 1.08: Bike Box

improving cycling at the local level through minor modifications. New striping patterns and the inclusion of bike lanes are topics discussed for major urban streets and minor urban streets (1-22). As with the previously publication, the guidelines produced by the Institute of Transportation Engineers briefly outlines a strategy for enhancing bicycle visibility at intersections (23-27). Unfortunately, these recommendations are limited to residential crossings, showcasing a confined understanding of the topic at the time of publication. Despite this shortfall, this information can be supplemented with newer research on the use of the protected intersection concept for cyclists (Figure 1.11). Rather than the use bike boxes, this design concept advocates the separation of bike traffic and automobiles in order to avoid the right turn conflict between these two users at intersections (Falbo). While each recommendation differs between sources, each suggestion aims to solve a common issue.

The success of a pedestrian and bicycle network plan should not limited to modifications on the groundplane, as the collection of research suggests alterations must be made to traffic signals and roadway signage as well. Literature from the Institute of Transportation Engineers argues that traffic signals must be able to account for the amount of time it takes for cyclists to pass through an intersection when setting green and yellow timers in intersection traffic signals (65-72). The Urban Bikeway Design Guide further expands on this concept by suggesting the inclusion of bicycle signal heads, signal detection, and warning beacons to detect the presence of cyclists when they approach the intersection, a feature that had traditionally not been integrated in our urban infrastructure fabric (Figure 1.12). Additionally, better signage can inform motorist of bike routes and circulation changes, improving safety for all of those involved on the urban street (Figure 1.13) (National Association of City Transportation Officials 127-160). These changes are crucial, as these modifications aim to alter the flow and efficiency of the system, while many groundplane changes are geared at affecting the positioning of users within the system.

Once the urban fabric has been altered and safety improvements have been observed and followed, a secondary set of enhancements aimed at prioritize cycling safety can be implemented. While the previous recommendations are aimed at improving safety between automobile and cyclists interactions, these guidelines aim to improve the health safety of cyclist to adverse climatic conditions. Often, adverse weather can discourage individuals to utilize alternative transportation, adding to vehicular congestion; however, "there are cities in the Netherlands installing rain sensors on their bicycle traffic lights so that when it rains, or snows, or gets to cold, those cyclists are prioritized right through those intersections" (Colville-Anderson). This signal system can be further observed by looking at the "green wave" in Copenhagen, a series of signals that allow cyclists to pass through intersection after intersection continuously if riding at the correct speed (Colville-Anderson). These additional features allow cyclists to continue to utilize bicycle infrastructure in a manner that limits their exposure to adverse climatic conditions that could negatively impact their health.

Keeping a focus on improving user safety within the urban right-of-way will serve as one of the primary goals of this comprehensive project. This awareness toward safety will help to determine design guidelines for trail typologies, signage, crosswalks, and visibility elements. These various design details will help to separate various users groups, limiting negative interaction that could jeopardize the safety of users.

Conclusion

The research presented in this literature review concentrates on several key findings crucial to designing and implementing and urban bicycle and pedestrian trail loop within the City of Cleveland. The discoveries found and in relation to trail connections, recreation and health, economic stimulation, and trail safety and features, helps to establish the design principles needed to execute this project. As Cleveland continues to reinvent its image and culture, the need for an alternative transportation infrastructure and a holistic urban core will continue to grow. If successful the economic benefit this trail provides could spur further growth in the community, creating that holistic image. Through the use of this urban trail, Clevelanders may be able to experience a better connected, healthier, prosperous, and safe future.

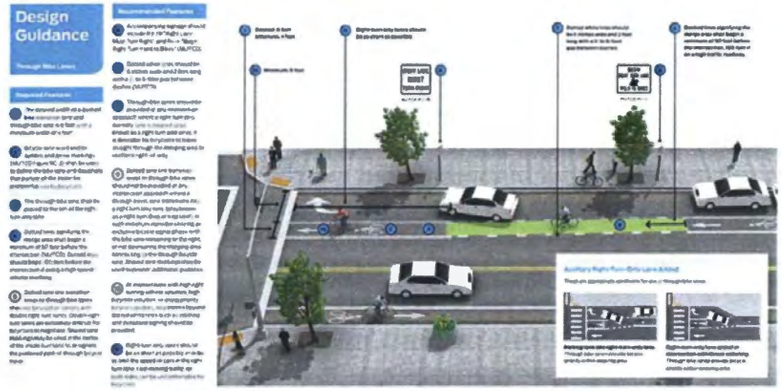


Figure 1.09: Through Bike Lane Design Guidance from NACTO

Figure 1.10: Refuge Island

Figure 1.11: Protected Intersection Layout

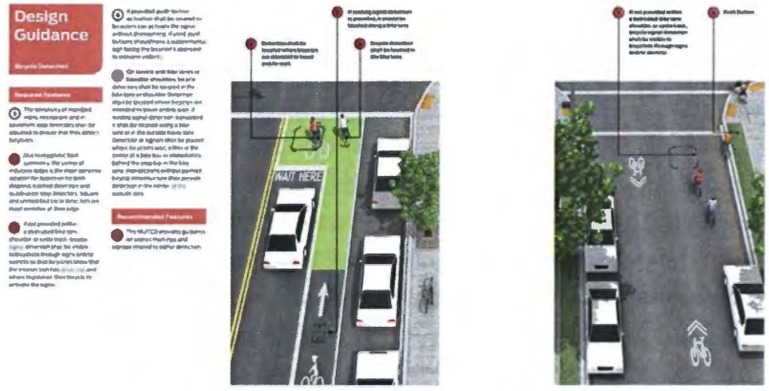


Figure 1.12: Signal Detection and Actuation Design Guidance from NACTO

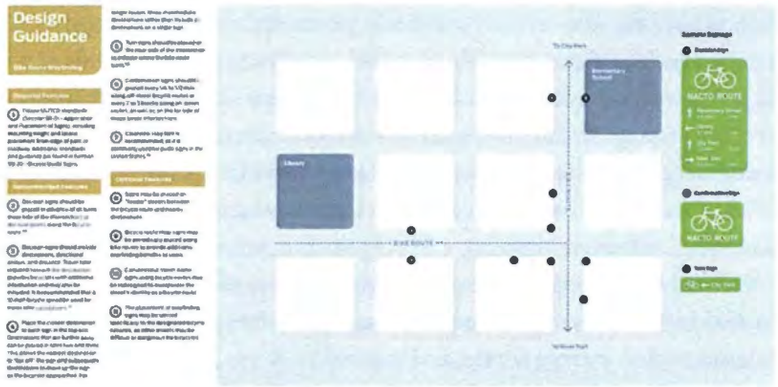


Figure 1.13: Bike Route Wayfinding Design Guidance from NACTO

Figure 1.14: Copenhagen Green Wave Lighting System

Methodology

This methodology aims to guide the research and design process in order to establish a body of knowledge and the design criteria needed to connect Downtown Cleveland and its surrounding neighborhoods through the creation of bicycle and pedestrian loop trail. By analyzing a number of topics and challenges associated with this proposition, this study utilizes a variety of methods to connect local data with literature, published observations, and case studies throughout the country.

When concerning the creation of alternative transportation means, it is essential to gain a complete understanding of the connective challenges the urban core presents in order to achieve a successful outcome. When concerning the City of Cleveland, it is particularly important to critically analyze each of the downtown districts and the current use of the urban right-of-way in order to understand the unique challenges the region faces, allowing similarities between these findings and the published body of literature to be realized. Geographic information system (GIS) data obtained from the Cleveland City Planning Commission (601 Lakeside Avenue, Cleveland, OH 44114) is used to gather and analyze information relating but not limited to traffic flow rates, pedestrian access, walk scores, current cycling initiatives, present alternative transportation infrastructure, and current land use. Future propositions and current initiatives relating to bicycle and pedestrian infrastructure in the urban core and throughout the city has been discussed with Donn Angus (Chief City Planner | Urban Design and Infrastructure), Martin Cader (Bicycle and Pedestrian Coordinator | Urban Design and Infrastructure), and Arthur Schmidt (Transportation and Streetscape Planner | Urban Design and Infrastructure), whom are members of the Planning Commission. Additionally, this data was compared to information collected from national case studies, including the Katy Trail (Dallas, Texas), the Atlanta BeltLine (Atlanta, Georgia), and the Indianapolis Cultural Trail (Indianapolis, Indiana). Lastly, the topics of resource proximity and sociability, two topics that heavily relate to place connectivity, were analyzed through The Walkable City and The Street: A Quintessential Social Public Space.

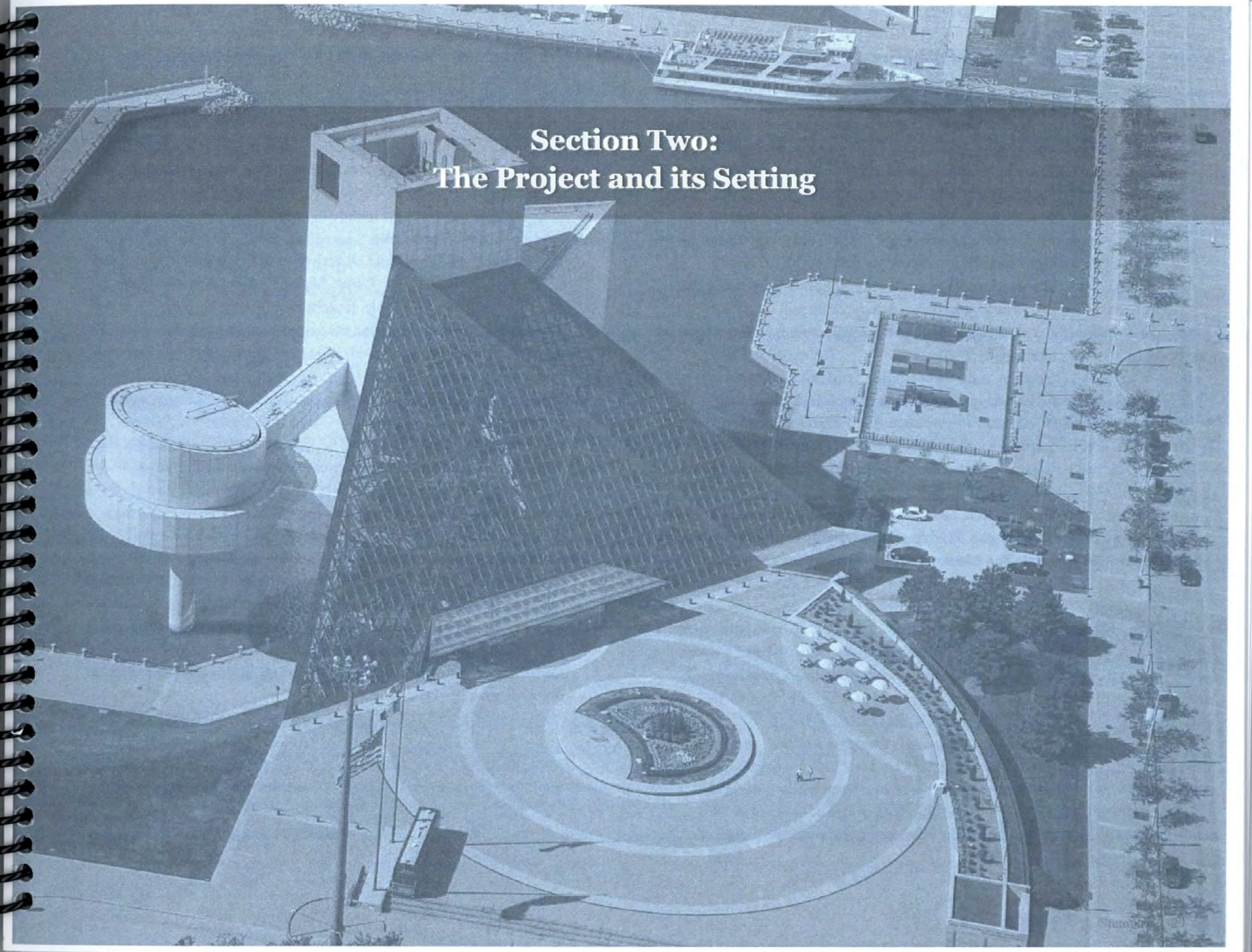
Since the Cleveland City Planning Commission analyzes the impact of potential projects in terms of equity, health, and safety, the challenges in creating a urban bicycle and pedestrian trail loop must be addressed in regards to the following topics: economic development and stimulation, recreation and health, and safety and streetscape features. To achieve a thorough understanding of these issues, a combination of direct site observation, GIS analysis, literature reviews, case studies, and design standards was used. Through site observation and GIS analysis, detailed information regarding general economic status and land use was utilized in order to better understand the local economic of each connecting neighborhood. Site observation was primarily focus on photo documentation and will simply be used to confirm findings compiled from GIS inventory and analysis maps. Books such as Trail Planning, Design, and Development Guidelines, Implementing Bicycle Improvements and the Local Level, and the Urban Bikeway Design Guide were used to establish recognized safety guidelines and standards needed to achieved a maximum and flexible recreational benefit. This findings were verified through the use of articles, including "The Safety of Walking and Cycling in Different Countries", "From Trail Towns to TrOD: Trails and Economic Development", and "Property Value Trends Assessment." These standards and articles are essential to helping creating the design language needed for a bicycle and pedestrian trail loop. Lastly, these findings were compared to those presented in

successful case studies such as the Katy Trail (Dallas, Texas) and the Indianapolis Cultural Trail (Indianapolis, Indiana).

The data discussed in the previous paragraphs was collected in a number of methods as they must be retrieved from a variety of sources. GIS data from the City Planning Commission was retrieved in August 2015 at Cleveland City Hall (601 Lakeside Avenue, Cleveland, OH 44114) and data from the Northeast Ohio Areawide Coordinating Agency (NOACA) website was retrieved in January 2016. Additional information such as site photos, and field notes, was collected between December 2015 and March 2016. Printed literature and printed case studies were found at gathered at Ball State University's Architecture Library and Bracken Library and several academic articles were found on this institutions online database (primarily Academic Search Premier). Trail Planning, Design, and Development Guidelines, Implementing Bicycle Improvements and the Local Level, and the Urban Bikeway Design Guide was routinely referenced throughout this process as they provide general design guidelines when implementing bicycle infrastructure in an established streetscape. Additionally, supplemental information was found on the web through the use of several search engines. As information is gathered, it was collected and stored on the researcher's personal computer, a one-terabit external hard-drive and in a Google Drive folder. Ultimately, this information is documented in photographs, computer graphics, drawings, and narratives.

Determining potential streets for the downtown bicycle and pedestrian trail loop requires a thorough analysis of compiled dated. Relevant GIS data pertaining to streetscape safety, location of amenities, alternative transportation, and other desirable qualities were utilized in this process. Each of these information points was ranked upon a point value system, with more desirable qualities given a higher value over less desirable qualities. Each of these files was converted to a raster system and then combined to form a predictive model. This simulation produces maps that visually begin to highlight areas of higher potential for the bicycle and pedestrian trail loop based on the rankings of the input data. Areas that have a higher added point value show more favorably while lower point values do not display prominently on the map. This gives this project a narrow selection of streets to look at when entering the conceptual design phase of this project.

Further determining potential streets in the conceptual design utilized information collected from the predictive model and from additional outside sources that could not be included in the GIS analysis. Initial streets were chosen from the model; however, street eligibility was further confirmed or denied upon comparing it with the additional data. This information included available right-of-way space (width), potential for vehicle and pedestrian conflict (drives, alleys, and intersections), and availability to connect to other bicycle routes. In many instances, many streets deemed acceptable in the model were eliminated due to these additional outside influences. Overall, this process formed the basis for the final route of the bicycle and pedestrian trail loop.



Section Two:
The Project and its Setting

Project Goals and Objectives

- **Enhance the quality of and ability for people to interact with the natural and build environment in the downtown neighborhood.**
  - Create trails aimed connecting people with a variety amenities.
  - Direct sightlines to focal features.

- **Improve streetscape safety for cyclist and pedestrians in the urban right-of-way.**
  - Use appropriate and clear signage and signals along the trail and right-of-way.
  - Develop appropriate and aesthetically pleasing pavement markings.
  - Implement the use of buffers and other safety measures.

- **Promote economic activity in areas adjacent to the urban trail.**
  - Implement safety measures that will foster a bicycle culture.
  - Create material aimed at promoting alternative transportation means.

- **Provide a safe and flexible recreational space for those who live and work in the downtown community.**
  - Utilize and design with dimensions that adequately serve several different recreational activities.
  - Create a uniform and simple system of trail system markers.
  - Utilize appropriate planting and hardscape buffers that separate users from vehicular traffic.

Summary of the Issue

Connectivity
The issue of connecting users from space is common in many downtown communities. Trails and traffic have the ability to seamlessly connect two spaces; however, if done incorrectly, it also has the potential to isolate other locations from the remainder of the network.

Economic Enhancement
The economic status of the urban core often serves as the visual indicator of the success of the city. Often, blighted areas deter individuals for downtown regions as people feel they negatively impact the overall pedestrian experience. Further economic success can result from this trail development project as additional pedestrians will utilize the urban street.

Recreation and Health
Flexibility in fitness and recreation is commonly recommended by health professionals. Unfortunately, many individuals and families often do not have easy access to multiple forms of fitness. Trail development allows people to easily access linear spaces that can be used in multiple ways.

Streetscape Safety
The perceive threat to safety often serves as a barrier to the establishment of a bicycle cultural in urban areas. This is often contributed to the presence of a variety of user groups that require differing standards for optimal travel in these public spaces. To minimize this perceived threat, safety standards need to be abided by an implemented aimed at improving the bicycle culture.

Client and Users

The bicycle and pedestrian trail loop system has the potential serve a diverse audience and any type of user that visits Downtown Cleveland. Despite this ability to be utilized by different types of individuals, the primary users of this trail are the residents of the downtown neighborhood, residents of nearby Cleveland neighborhoods, and individuals who work within the urban core. Since these people are the primary users of the proposed trail, the layout and destination of this project will be aimed at serving the needs of these individuals.

While the citizens of Cleveland serve as the primary user of this group, the client of this project is the City of Cleveland, with much of the work and review being conducted through the Cleveland Planning Commission. This organization within the city structure consists of various design and planning professionals charged with guiding development within the city. These individuals help to guide program development and ensure projects aim to improve the lives of those they impact.

Site Program

While this this project aims to accomplish a number of goals and objectives, the project primarily serves to programmatic functions.

Recreation and Fitness (Trails)

- Bicycling
- In-Line Skating
- Running and Jogging
- Unicycling
- Wayfinding and Route Signage
- Event Usage

Alternative Transportation

- Bicycling Transportation
- Bus Connectivity and Shelter
- Bike Sharing
- Pedestrian Usage

Site Considerations and Concerns

Considerations

- **Trail Connectivity** – The presence of bicycle infrastructure in some areas of the city needs to be considered when determining the layout the of downtown trail system. Connecting to these systems creates a more holistic system.

- **Potential Future Development** – As with many cities, the City of Cleveland is constantly evolving to meet the needs of its residents. Currently known prospective projects should be considered in the layout of the trail as this development may impact the future of the area it is located.

- **Economic Development** – Areas in need of further economic development need to be considered when determining trail location. Research shows trail development has the ability to positively impact businesses along the trail.

- **Alternative Transportation** – The ability to connect to outside transit systems (bus, train) needs to be considered as these methods allow for a wider audience to be impacted and utilize the trail system.

Concerns

- **Right-of-Way Availability** – Since this project will only utilize available right-of-way space for the downtown trail, finding a number of streets with available space potentially could serve as a challenge.

- **Future Traffic Patterns** – Throughout the course of this project, several assumptions need to be made in the decision making process. While this trail has the potential to lessen the number of vehicles in the right-of-way, there is no way to definitively determine the natural changes to future traffic patterns when altering travel and parking lanes.

Site History - Cleveland History

Since its originally settlement in 1796, the City of Cleveland has had a varied history of economic prosperity and decline. While the many view Cleveland as having an industrial past, this was not always the case. Despite its favorable location along Lake Erie, the settlement of Cleveland was extremely slow during the early 1800s due to a lack of investment in the area. It was not until the construction of the Erie Canal and the railroad did Cleveland become an economic center (Cleveland, Ohio).

During the mid and late nineteenth century, Cleveland began to experience the industrial and economic growth it is often known for. The industrial revolution coupled with the need for materials during the Civil War allowed the establishment of a manufacturing economy. Industrialists such as John D. Rockefeller and Samuel Mather were attracted to the area as it was conveniently located near desirable transportation routes (Figure 2.03 - 2.04) and large deposits of iron ore. The increase in prospective employment attracted workers to the area, causing the population to drastically increase until the mid-twentieth century (Cleveland, Ohio)

After World War II, the City of Cleveland began to slowly fall into decline. After reaching its peak population of over 900,000 in 1950, families decided to leave the urban center and move into newly formed suburbs. Over time, industry negatively impacted the community, as factory waste polluted rivers and the lake to toxic levels. This issue was brought to national prominence in 1969 when Time Magazine posted photographs of the Cuyahoga River burning due to high levels of oil, sludge, and other toxic materials (Figure 2.05). This, coupled with new opportunities outside the city, has driven individuals away from the city center since the 1950s (Cleveland, Ohio).

Today, the city is beginning to rebound from the issues it has experienced over the past sixty years. While the population is now under 400,000, many young individuals are beginning to recognize an importance of the city center, spurring new growth in that area. This increase in the downtown population is project to drastically increase in the next decade, allowing for new economic and social growth to occur.

Figure 2.01: Public Square during the Early 1900s

Figure 2.02: Euclid Avenue during the Early 1900s

Figure 2.03: Shipping along the Cuyahoga River circa 1905

Figure 2.04: Standard Oil Refinery circa 1889

Figure 2.05: Cuyahoga River Fire circa 1952

Figure 2.06: Cleveland Streetscape and Rail Lines during the Early 1900s

Site History - City Neighborhoods

Neighborhood Overview

Like many cities, the City of Cleveland is broken into several neighborhoods based on geographical location or a social commonality exhibit by many who reside in that location. These neighborhoods consist of various socio-economic statuses and portray different cultural and architectural distinctions from location to another. In recent years, several neighborhoods surrounding the Downtown Neighborhood have become local destinations as their amenities have attracted young professionals who desire to move near the city center. The Ohio City and University Circle neighborhoods have become food and cultural destinations while the Edgewater Neighborhood has become a location for large-scale gatherings along the lakefront. Overall, the City of Cleveland has thirty-six neighborhoods with each one having a different experience to offer (Figure 2.15).

Neighborhod Listing

Brooklyn Centre, Buckeye-Shaker, Central, Clark-Fulton, Corlett, Cudell, Detroit-Shoreway (Figure 2.07), Downtown, Edgewater (Figure 2.08), Euclid-Green, Fairfax, Forest Hills, Glenville, Goodrich-Kirtland Park, Hough, Industrial Valley (Figure 2.09), Jefferson, Kamms Corners, Kinsman, Lee-Miles, Mt. Pleasant, North Broadway, North Collinwood, Ohio City (Figure 2.10), Old Brooklyn, Puritas-Longmead, Riverside, South Broadway, South Collinwood, St. Clair-Superior (Figure 2.11), Stockyards, Tremont (Figure 2.12), Union-Miles Park, University Circle (Figure 2.14 -2.15), West Boulevard, Woodland Hills

Figure 2.07: Detroit-Shoreway Neighborhood

Figure 2.08: Edgewater Neighborhood

Figure 2.09: Industrial Valley Neighborhood

Figure 2.10: Ohio City Neighborhood

Figure 2.11: St. Clair-Superior Neighborhood

Figure 2.12: Tremont Neighborhood

Figure 2.13: University Circle Neighborhood

Figure 2.14: University Circle Neighborhood

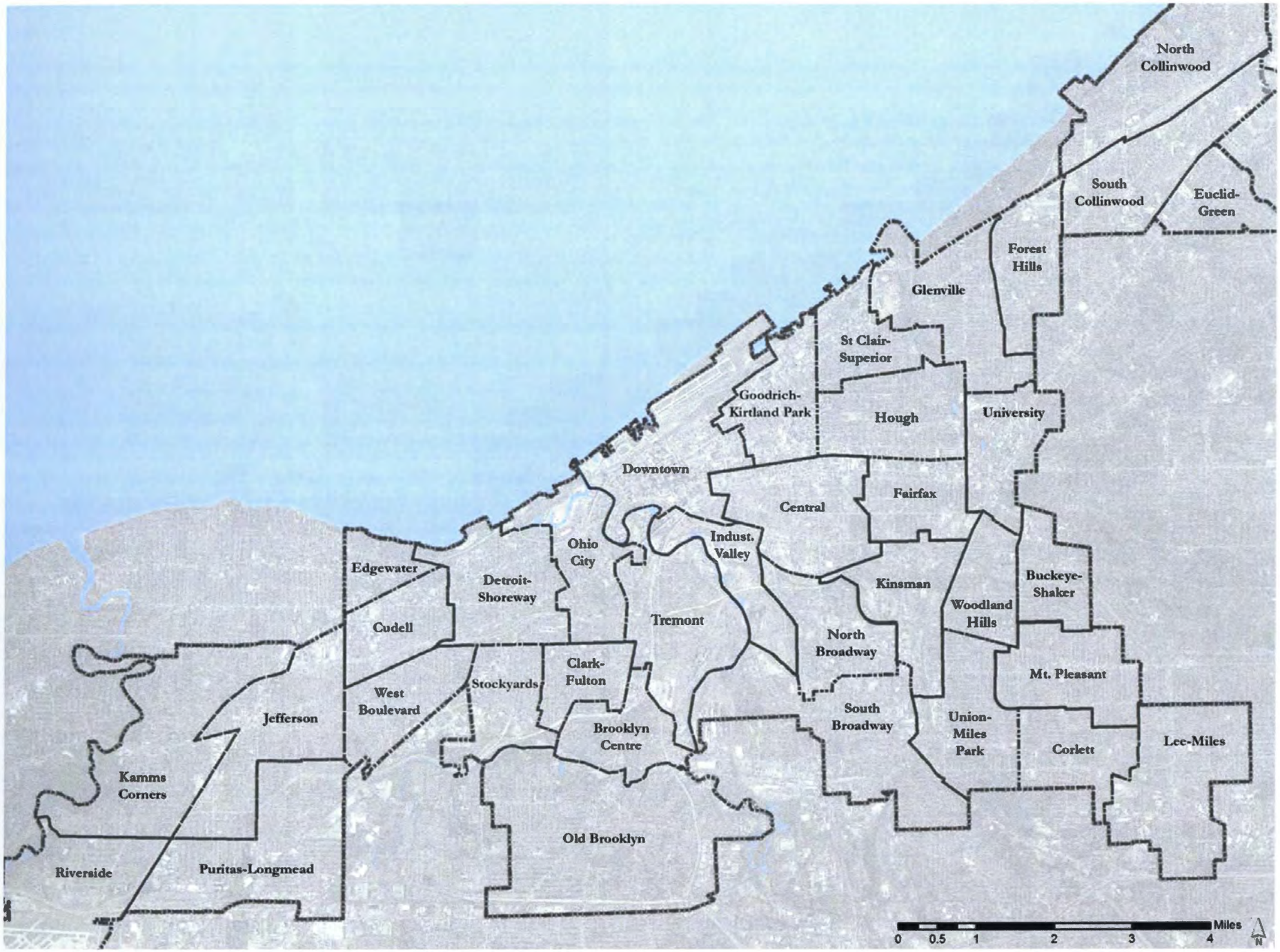


Figure 2.15: Boundaries of the City of Cleveland Neighborhoods

Site History - Downtown Districts

Downtown Districts Overview

While the City of Cleveland has experienced an overall decline in population since the 1950s, recent interest in the downtown core has caused an increase in housing needs in this area. In 2000, the population of the downtown neighborhood was approximately 9,500. Today, downtown residents total 13,000 and this number is projected steadily rise in the coming years.

The diversity in culture, architecture, and activity that occurs within the Downtown Neighborhood allows for this area to be further divided in twelve districts (Figure 2.24). These districts each exhibit a unique identity and provide different opportunities for those how live, work, and visit these areas.

Downtown Districts Listing

- Avenue District
- Burke Lakefront Airport (*Private*)
- Campus District (Figure 2.16)
- Civic Center District (Figure 2.17)
- Gateway District (Figure 2.18)
- Nine-Twelve District
- North Coast Harbor (Figure 2.19)
- Playhouse Square District (Figure 2.20)
- The Flats (Figure 2.21)
- The Port (*Private*)
- Tower City District (Figure 2.22)
- Warehouse District (Figure 2.23)


Figure 2.16: Campus District


Figure 2.17: Civic Center District


Figure 2.18: Gateway District


Figure 2.19: North Coast Harbor


Figure 2.20: Playhouse Square

Figure 2.21: The Flats


Figure 2.22: Tower City District


Figure 2.23: Warehouse District

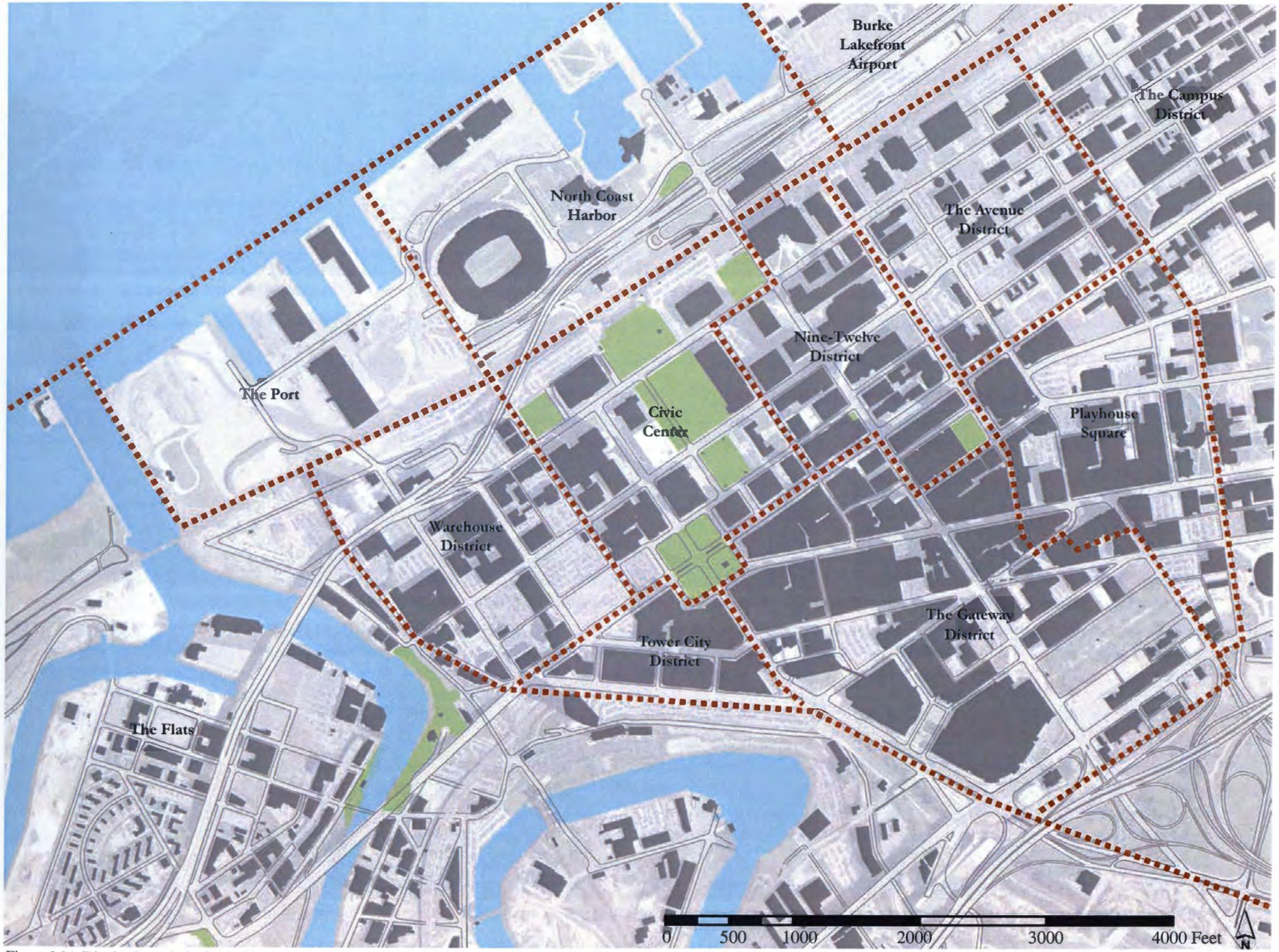


Figure 2.24: District Boundaries in the Downtown Neighborhood

Existing Conditions and Site Quality

Lakeside Avenue (Figures 2.25 – 2.30)

Lakeside Avenue is a primary east-west roadway located in the northern portion of the Downtown Neighborhood, running through the Avenue District, the Civic Center District, and the Warehouse District. This serves as the last major non-interstate route prior to reaching Lake Erie and connects individuals with several local amenities. Government buildings such as Cleveland City Hall, the Probate Court of Cuyahoga County, and the Cuyahoga County Common Pleas Court are located along this route. Additional points of interest along this street in the downtown neighborhood include Fort Huntington Park, the Cleveland Convention Center, Erieview Plaza, and Willard Park. This street contains no bicycle infrastructure and contains few complete street qualities such as street trees.

Prospect Avenue (Figures 2.31 – 2.39)

Prospect Avenue is a primary east-west roadway located in the southern-central portion of the Downtown Neighborhood. This street intersects with several districts including the Tower City District, the Gateway District, the Playhouse Square District, and the Campus District. This street contains a high amount of traffic as it serves as an entrance point to several business and local amenities. While Tower City, the Horseshoe Casino, East 4th St, the Wolstein Center, and Cleveland State University are all located along this route, this street has the potential for further economic development. This street currently does not contain bicycle infrastructure; however, it does have several desirable qualities such as street trees, plazas, and seating elements.

Figure 2.25: Lakeside Ave at E 10th St

Figure 2.26: Lakeside Ave Between E 10th and E 9th St

Figure 2.27: Lakeside Ave near E Mall Dr

Figure 2.28: Lakeside Ave Between E Mall and W Mall Dr

Figure 2.29: Lakeside Ave at W 3rd St

Figure 2.30: Tree Grate and Brick on Lakeside Ave

Figure 2.31: Prospect Ave Between W 3rd and W 6th St

Figure 2.32: Pavement Condition on Prospect Ave

Figure 2.33: Prospect Ave near W 2nd St

Figure 2.34: Building Condition on Prospect at E 2nd St

Figure 2.35: Prospect Ave near E 4th St

Figure 2.36: Prospect Ave near E 8th St

Figure 2.37: Plaza off Prospect Ave near E 9th St

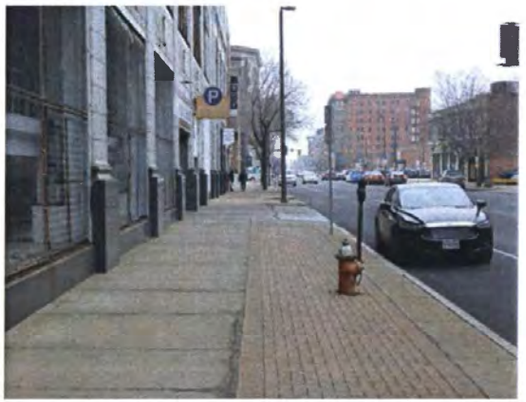


Figure 2.38 Prospect Ave between Huron Rd and E 14th

Figure 2.39: Wolstein Center along Prospect Ave

Existing Conditions and Site Quality

Superior Avenue (Figures 2.40 – 2.45)

Superior Avenue is a primary east-west roadway located in the central portion of the Downtown Neighborhood. This street intersects with several districts, including the Warehouse District, the Tower City District, the Civic Center District, the Gateway District, the Avenue District, the Nine-Twelve District, the Playhouse Square District, and the Campus District. This street contains a wide right-of-way (135 feet) and contains a high amount of vehicular and bus traffic as in serves as a major route for the Cleveland RTA. This street serves a central focus to the city, as it also intersects Public Square. Currently this street contains bike lanes (on certain sections) and bus lanes (on certain sections). This street also contains large sidewalks with street trees, planters, and seating for pedestrians.

East 22nd Street (Figures 2.46 -2.54)

East 22nd Street is a primary north-south roadway located on the far eastern portion of the Downtown Neighborhood. This street is solely located in the Campus District and serves as a major one-way (north running) vehicular route for the Cleveland State Community. This street contains unique circumstance as multiple structures span over the street, limiting the available right-of-way. Additionally, while this is a primary street south of Chester Avenue, the roadway gives way to secondary access north of the Chester-East 22nd intersection. On campus, pedestrian infrastructure is in excellent condition; however, sidewalks need to be replaced in less traveled residential areas.

Figure 2.40: Superior Ave at E 22nd St

Figure 2.41: Superior Ave between E 21st and E 22nd St

Figure 2.42: Art along Superior Ave at E 21st St

Figure 2.43: Bike Lanes along Superior Ave

Figure 2.44: Superior Ave at E 13th St

Figure 2.45: Superior Ave at E 12th St (Wide Street)

Figure 2.46: East 22nd St at Propsect Ave

Figure 2.49: Under CSU Overpass at E 22nd St

Figure 2.52: Pavement Condition on E 22nd St

Figure 2.47: Bike Lanes on Euclid Ave at E 22nd St

Figure 2.50: Intersection at E 22nd and Chester Ave

Figure 2.53: E 22nd St between Payne and Superior Ave

Figure 2.48: CSU Overpasses on E 22nd St

Figure 2.51: E 22nd between Chester Ave and Payne Ave

Figure 2.54: E 22nd St between Payne and Superior Ave

Existing Conditions and Site Quality

West 6th Street (Figures 2.55 – 2.60)

West 6th Street is a secondary north-south roadway located in the western portion of the Downtown Neighborhood in the Warehouse District. This street contains a large right-of-way (99 feet) and serves as a cultural destination for the downtown community.

East 12th Street (Figures 2.60 – 2.63)

East 12th Street is a secondary north-south roadway located on the eastern portion of the Downtown Neighborhood. This street contains a large right-of-way (140 feet) and primarily connects users to high-rise residential and office destinations.

Mall C (Figures 2.64 - 2.66)

Located in the Civic Center District of the Downtown Neighborhood, Mall C serves as a visual connection point to North Coast Harbor and Lake Erie. This grassy area serves as a gather space and contains overlook points to the Rock and Roll Hall of Fame, the Great Lakes Science Center, First Energy Stadium, Voinovich Park, and Lake Erie.

Lorain Road Figures 2.67 – 2.69)

Lorain Road is a primary east-west roadway located on the western portion of the city. This street serves as a major artery into the downtown neighborhood and connects residents to several local amenities.

Figure 2.55: W 6th St near Lakeside Ave

Figure 2.56: W 6th St near Lakeside Ave

Figure 2.57: Historic Buildings on W 6th St near St. Clair

Figure 2.58: Planter Details along W 6th St

Figure 2.59: Bike Racks along W 6th St

Figure 2.60: W 6th St near St. Clair Ave

Figure 2.61: E 12th St near Superior Ave

Figure 2.62: E 12th St near Superior Ave

Figure 2.63: Red Furnishings along W 6th St

Figure 2.64: Mall C Looking North

Figure 2.65: Bike Racks along Mall C

Figure 2.66: Rock and Roll Hall of Fame View

Figure 2.67: Bike Lane along Lorain Rd

Figure 2.68: Lorain Road

Figure 2.69: Pavement Condition on Lorain Rd

Case Study: Indianapolis Cultural Trail

Designed by Rundell Ernsterger Associates, the Indianapolis Cultural Trail is an urban bicycle and pedestrian trail located in downtown Indianapolis, Indiana. This trail aims to connect several neighborhoods, districts, and city amenities by serving as a central connector for the regions trail and greenway system (Figure 2.74). The success of this project has spurred bicycle use within the downtown region and has proved to be an economic stimulus for areas bordering the trail. Local businesses, both new and old establishments, have reported an increase in customers and an increase in revenues since the construction of the cultural trail (Burrow and Majors 4). Additionally, this increase in revenue has allowed for the creation of approximately 100 full-time and part-time jobs (Burrow and Majors 5).

The elegant details of the Indianapolis Cultural Trail allow this project to serve as a linear landmark and icon for the city. This design uses a simplistic paving pattern (Figure 2.77), plantings (Figure 2.76), and art (Figure 2.75) to create a sense of continuity even as the trail stretches from one district to another. These elements, combined with clear and concise signage (Figure 2.72) allows visitors to easily navigate the trail when using for the first time. By connecting people, culture, art, and recreation, the Indianapolis Cultural Trail aims to better the lives of those who use it.

Figure 2.70: Pedestrians and Cyclists using the Cultural Trail.

Figure 2.71: Pedestrians and Cyclists using the Cultural Trail.

Figure 2.72: Signage along the Cultural Trail.

Figure 2.73: Oblique View of the Indianapolis Cultural Trail.

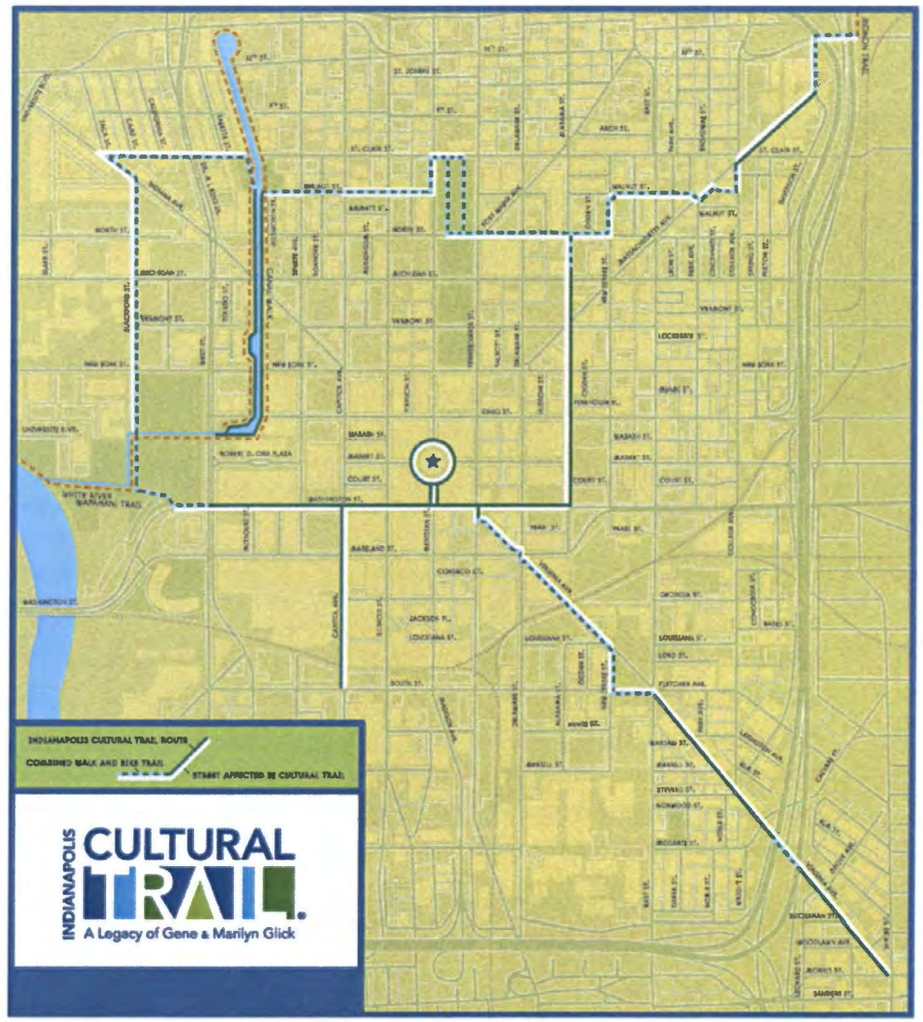


Figure 2.74: Indianapolis Cultural Trail Map.

Figure 2.75: Structural Installation along the Cultural Trail.

Figure 2.76: Trail Plantings.

Figure 2.77: Intersection Trail Treatments.

Case Study: Atlanta BeltLine

Originally conceived in 1999, the Atlanta BeltLine is a comprehensive transportation and economic development plan aimed at transforming the city through the arrangement and use of rail, trail, green space, housing, and art. This project uses trail and rail alternative transportation means to establish interconnected neighborhoods, providing greater individual mobility and an enhanced economic opportunity. Once compete, this project will connect 45 in-town neighborhoods and connect these locations to additional alternative transportation needs.

While this corridor primarily focuses on the use of rail to create connections, the principles discovered in this initiative can be transferred to the proposed bicycle and pedestrian trail loop system in Cleveland, Ohio. This system advances underutilized or neglected rail locations to create a quick alternate to traffic congestion. Increased use of these systems allow for economic development to occur in areas formerly vacant or underutilized. The consistent design language throughout this corridor allows this system to visually connect these different neighborhoods, enhancing community relations. This then transforms the BeltLine to not only become a transportation means; it also allows this system to become an experience and a destination itself. Once completed, this project will provide a comprehensive network of public parks, multi-use trails, and transit along twenty-two miles of former rail corridors, through the downtown region and its surrounding neighborhoods.

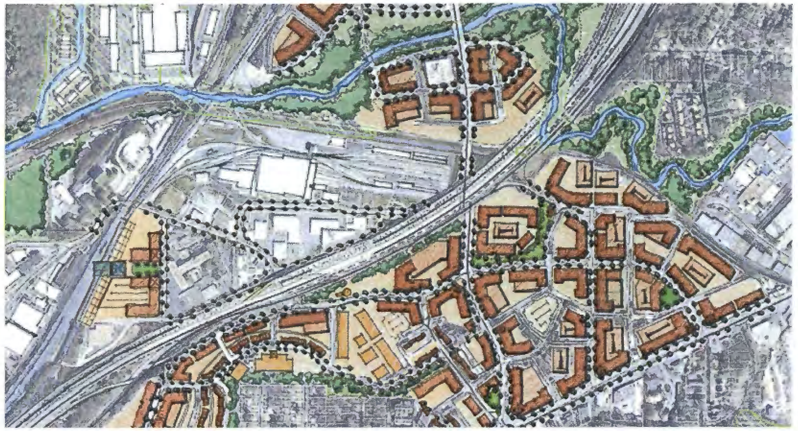


Figure 2.78: Development along the Atlanta BeltLine

Figure 2.79: Development along the Atlanta BeltLine

Figure 2.80: Development along the Atlanta Beltline

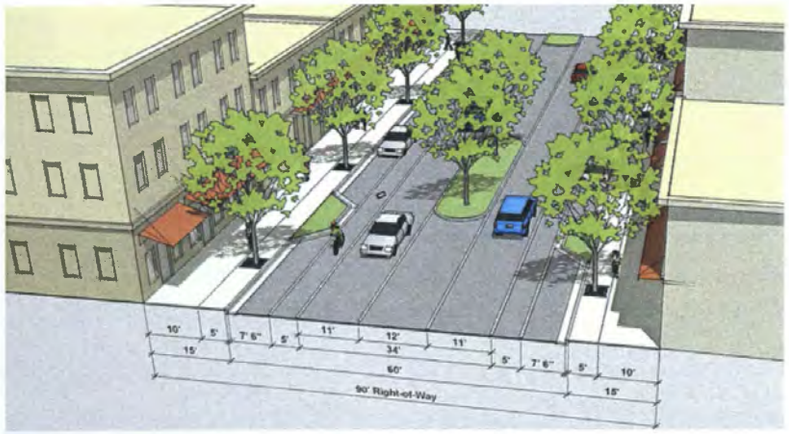


Figure 2.81: Complete Street Example for the Atlanta BeltLine

Figure 2.82: Rail Use Example in the Atlanta BeltLine

Figure 2.83: Rail and Trail Use Example in the Atlanta BeltLine

Figure 2.84: Trail Plan Oblique

Figure 2.85: Trail Use Example in the Atlanta BeltLine

Case Study: Katy Trail

Designed by the SWA Group, the Katy Trail serves as a linear park for the community while simultaneously connecting 20 neighborhoods and the individuals that reside in them to the urban center (Figure 2.91) (Ying-Yu, et. al. 128). A former rails-to-trails project in Dallas, Texas, this trail utilizes an abandoned rail link to rejuvenate that sector of the city. This long link allows individuals to effectively use cycling as a reliable means of transportation when moving between neighborhoods and districts. Additionally, this trail also connects with DART (Dallas Area Rapid Transit) stations in order to further promote a cycling and alternative transportation culture (Ying-Yu, et. al. 128).

A main concept in the design and implementation of this project concerns connecting individuals through recreation and a linear green space (Ying-Yu, et. al. 128). While communities and neighborhoods may differ, the common green space allows a constant to remain throughout this portion of the city. Many site details, including plantings, pavers, and materials help to reinforce this concept (Figure 2.87 - 2.88).

The flexibility of use the Katy trail provides enhances the recreational value and health benefits one can receive when using this amenity (Figure 2.86). Depending on area availability, this trail uses several design standards for the trails configuration. At times, this designed trail separates bicycle and pedestrian traffic to minimize conflict (Figure 2.89). In constrained conditions, the user groups are combined; however, groundplane markings are used to minimize confrontation (Figure 2.90).

According to SWA, approximately 2000 individuals utilize this trail every day (Ying-Yu, et. al. 128). The heavy use of this corridor continues to reinforce this trail's success in providing an alternative connective option between the different communities and centers in the Dallas area.

Figure 2.86: Flexibility of Use on the Katy Trail

Figure 2.87: Trail Gathering Spaces

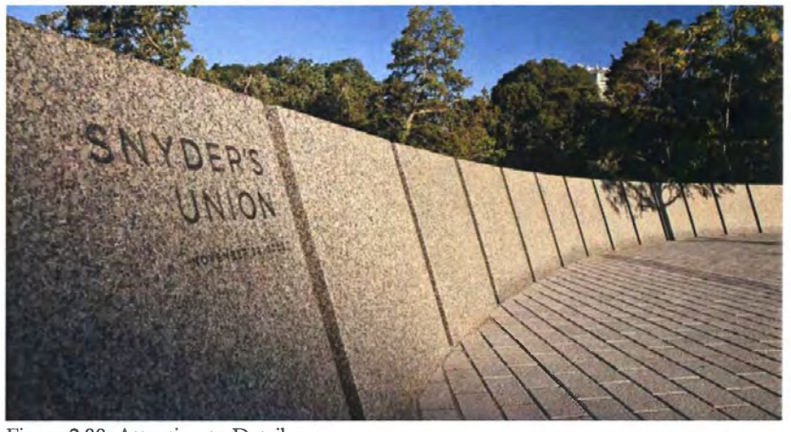


Figure 2.88: Attention to Detail

Figure 2.89: Separation of Uses

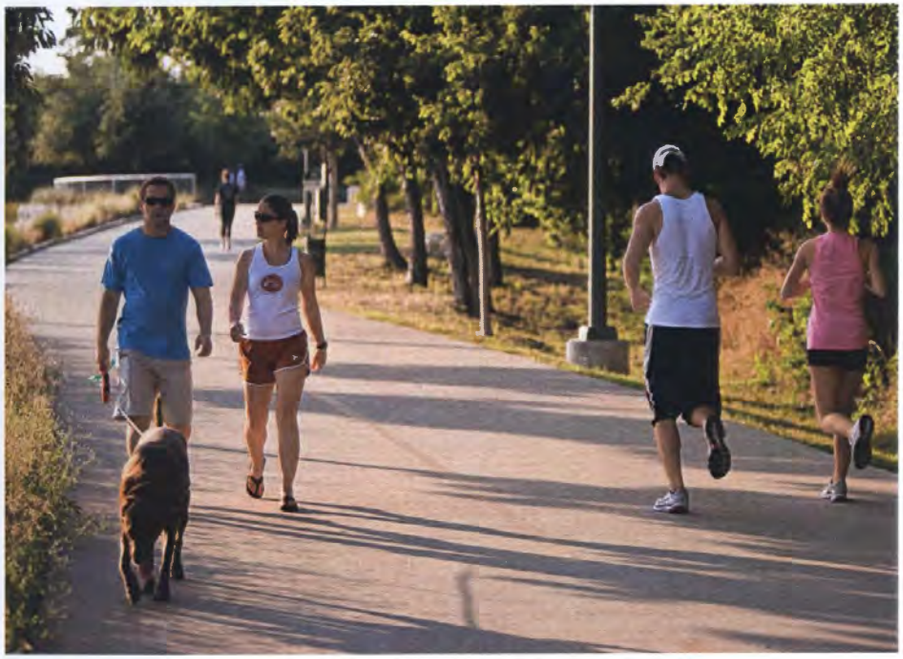


Figure 2.90: Combined Trail Uses

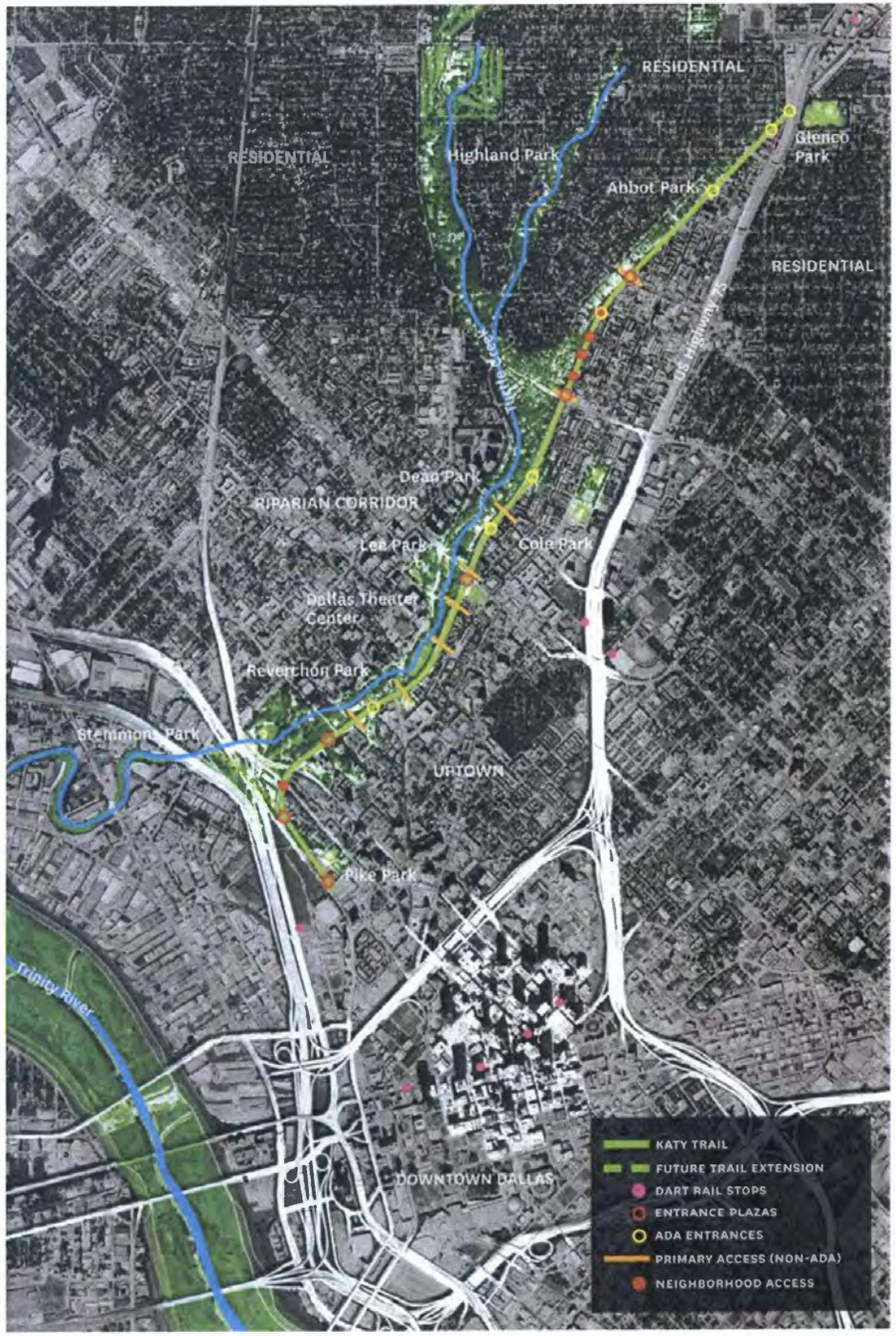


Figure 2.91: Katy Trail Map by SWA Group

Case Study: Seattle Bicycle Master Plan

The Seattle Bicycle Master Plan aims to establish a cycling culture in the City of Seattle in order to create a safe right-of-way environment for all users, encourage a healthy lifestyle, enhance equity, and to promote a sustainable infrastructure (Figure 2.95). This master plan utilizes several means to accomplish these goals. First, the plan promotes the conversion of traditional streets to complete streets to promote bicycle infrastructure. Second, this plan aims to expand the number of multi-use trails in order to reach additional destinations and neighborhoods. Lastly, this plan establishes programs to encourage alternative transportation means through bike sharing and promotional projects.

The creation of a uniform design language is essential to enhancing safety in the streetscape. This plan utilizes a variety of groundplane markings, signage, and signals to form a cohesive dialogue for all streetscape users (Figure 2.92 - 2.93). This dialogue informs cyclists of their preferred location within the right-of-way and warns motorists of their presence. Additionally, this system includes various measures aimed at maintaining a continuous flow of pedestrian, cycling, and vehicular traffic. For example, this system utilizes separate traffic lights for cyclists in order to protect cyclists from the left or right turn conflict, and to prevent them from entering the intersection at other inopportune moments (Figure 2.94). These types of measures can help minimize the psychological threat to safety many beginner cyclists have, allowing for the further growth of a cycling culture in the City of Seattle

Figure 2.92: Road Markings for the Seattle Bicycle Master Plan

Figure 2.93: Intersection Markings for the Seattle Bicycle Master Plan

Figure 2.94: Bicycle Street Signals

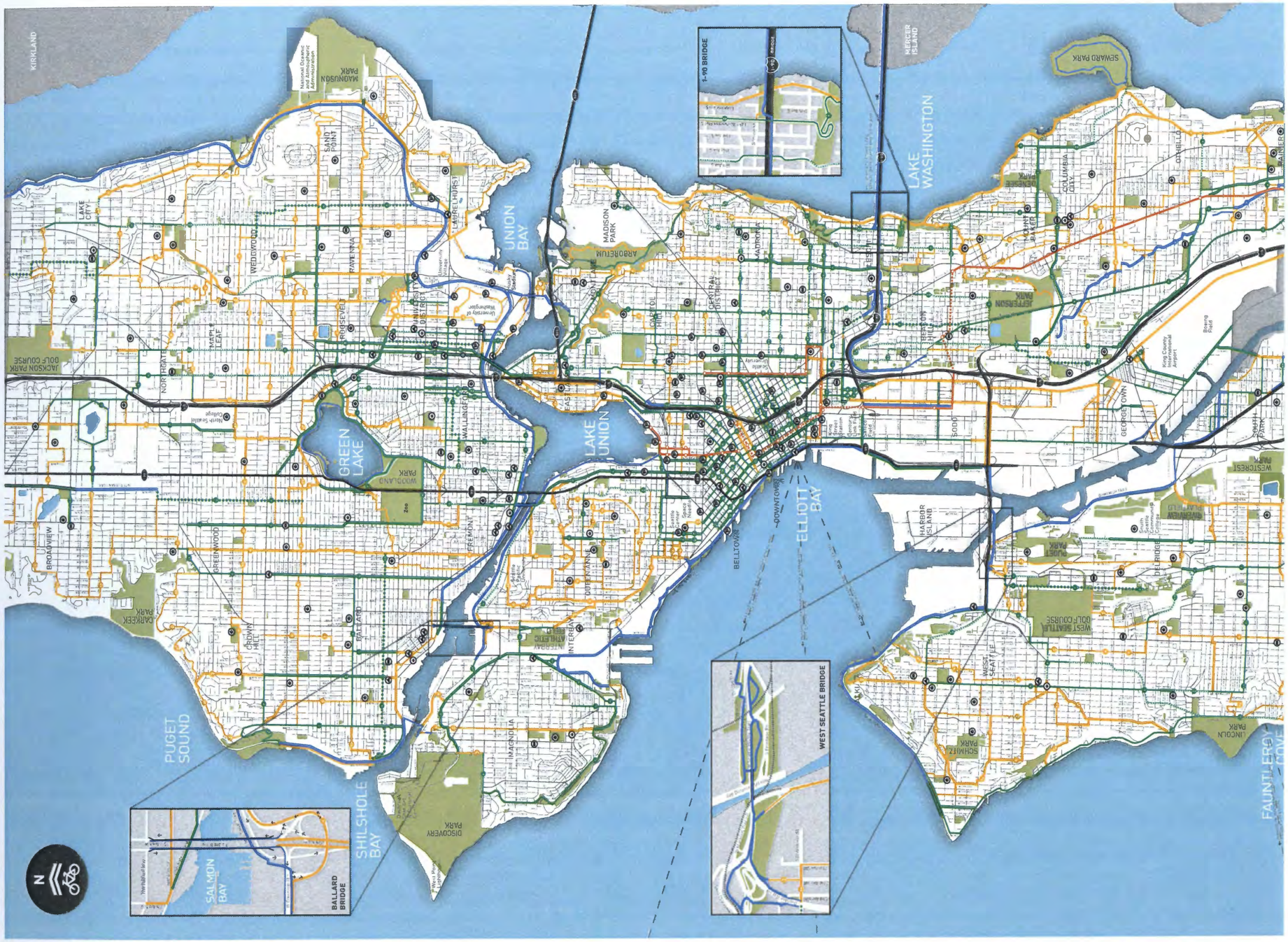
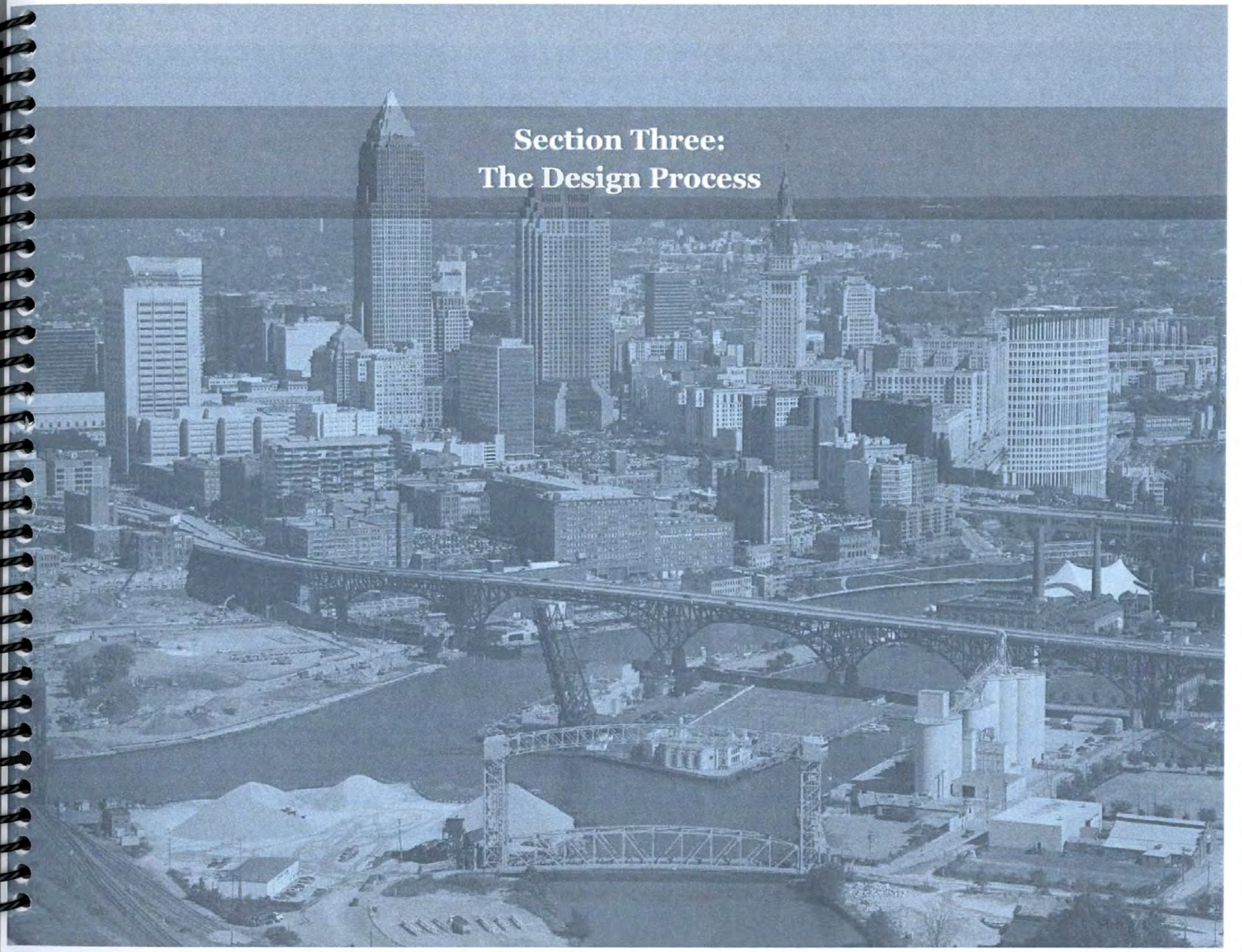


Figure 2.95: Seattle Bicycle Master Plan Map



Section Three:
The Design Process

Site Location

The primary location for the proposed bicycle and pedestrian trail loop system is the downtown neighborhood (Figure 3.02). This system incorporates each of the public districts within this neighborhood and aims to reach several diverse amenities the region has to offer (Figure 3.03). Trails located within the downtown districts will be explored and designed in detail during this project.

While the primary focus of this project is the downtown neighborhood, this project will also explore the potential for several bicycle infrastructure extensions that can radiate from this centralized trail loop into the surrounding neighborhoods (Figure 3.01). While this connective potential will be explored, it will not be designed in detail as the downtown bicycle and pedestrian trail loop is.

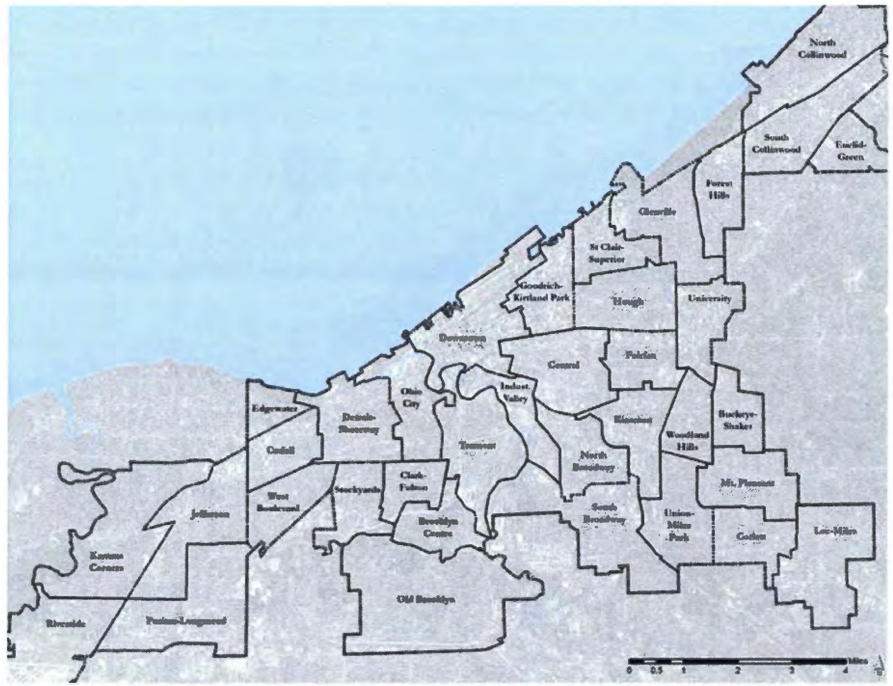


Figure 3.01: City of Cleveland Neighborhoods

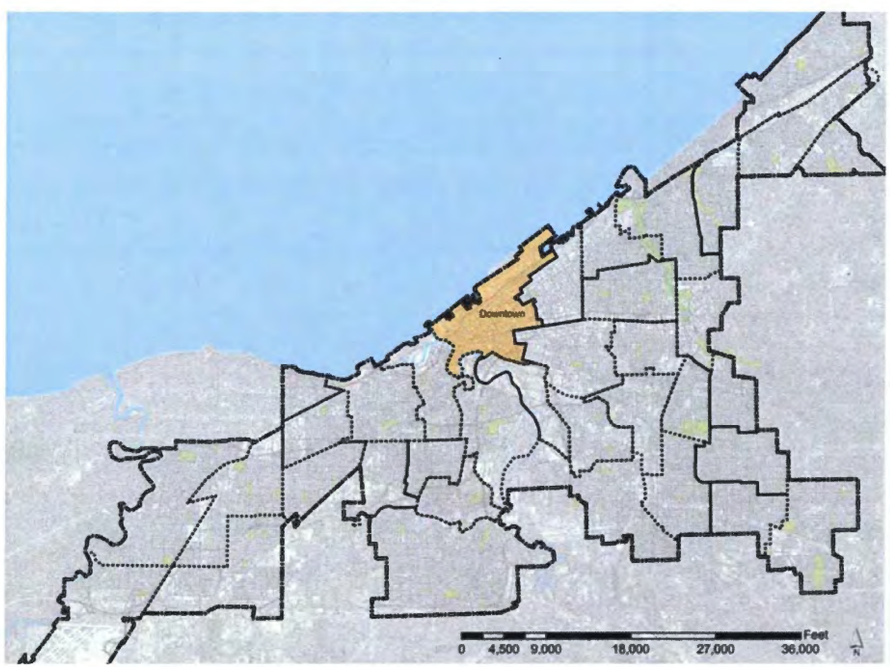


Figure 3.02: Downtown Neighborhood Isolation

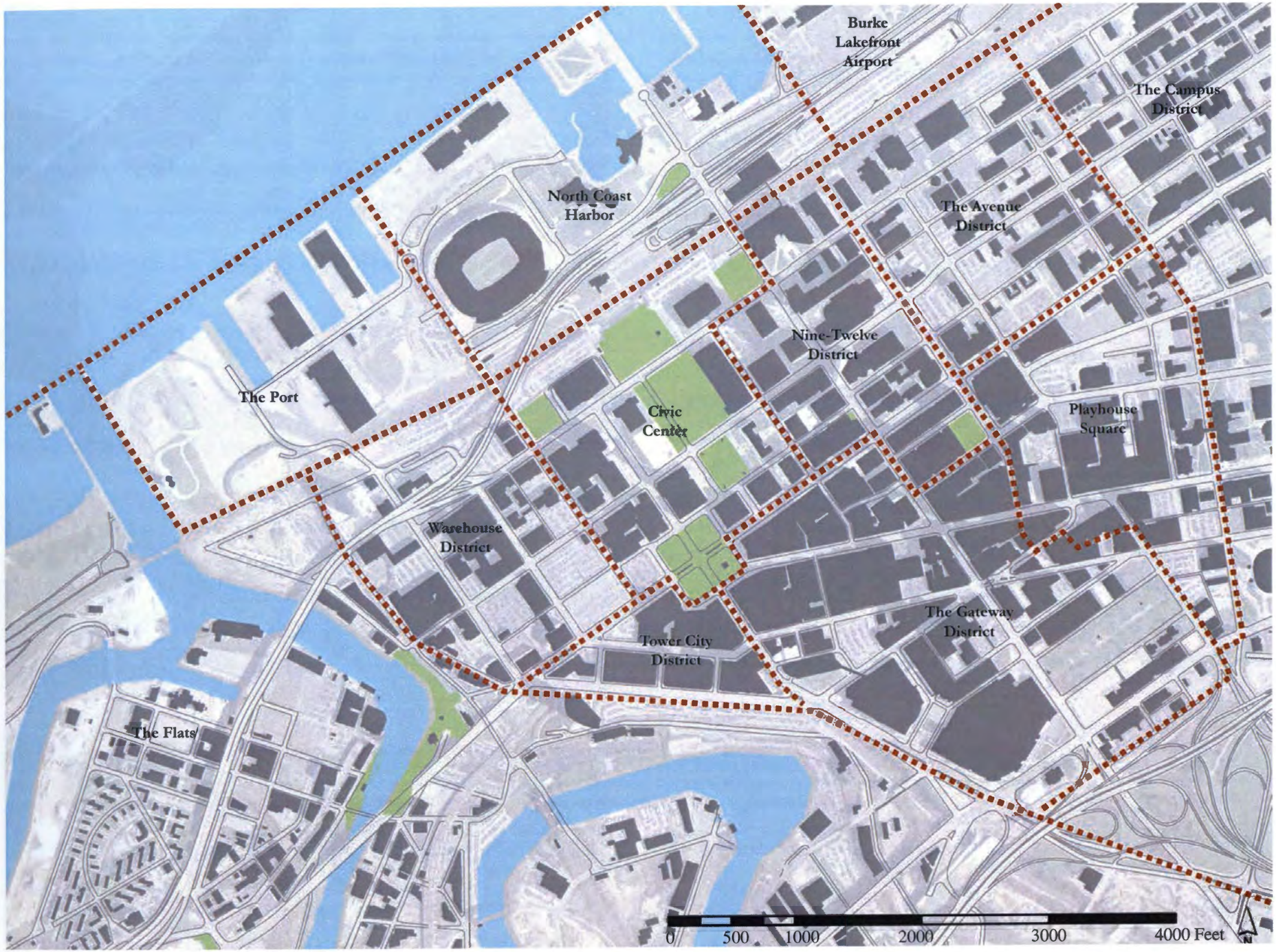


Figure 3.03: Downtown District Boundary Map

Site Context and Existing Bicycle Infrastructure

In recent years, the City of Cleveland has conducted several projects aimed at enhancing the area's bicycle infrastructure, allowing for more opportunities for transportation and recreational cycling in the urban street. These established projects, shown by the solid line in figure 3.12, include separated multi-use trails, bike lanes, and sharrows. While these cycling amenities provide benefits for those who live along the route, they fail to provide the complete and holistic system needed for the future of the city.

In addition to established projects, the city has cited several potential projects that could be implemented within the coming years. Many of these projects, shown by the dotted lines in figure 3.12, utilize stripping and markings to add bike lines or sharrows to existing streets. Other projects, such as the upcoming Lorain Avenue project, drastically reconfigure the urban street by including a separated bicycle trail on the urban street. If these proposals are implemented, it does begin to create a more holistic system than the current network; however, it still fails to provide adequate infrastructure near the downtown core.


Figure 3.04: Morgana Run Trail


Figure 3.05: Valley Parkway


Figure 3.06: Martin Luther King Jr. Drive


Figure 3.07: Scranton Towpath Trail


Figure 3.08: Detroit Avenue Bike Lane


Figure 3.09: East 72nd Street Bike Lane


Figure 3.10: Euclid Avenue Bike Lane


Figure 3.11: Puritas Avenue Bike Lane

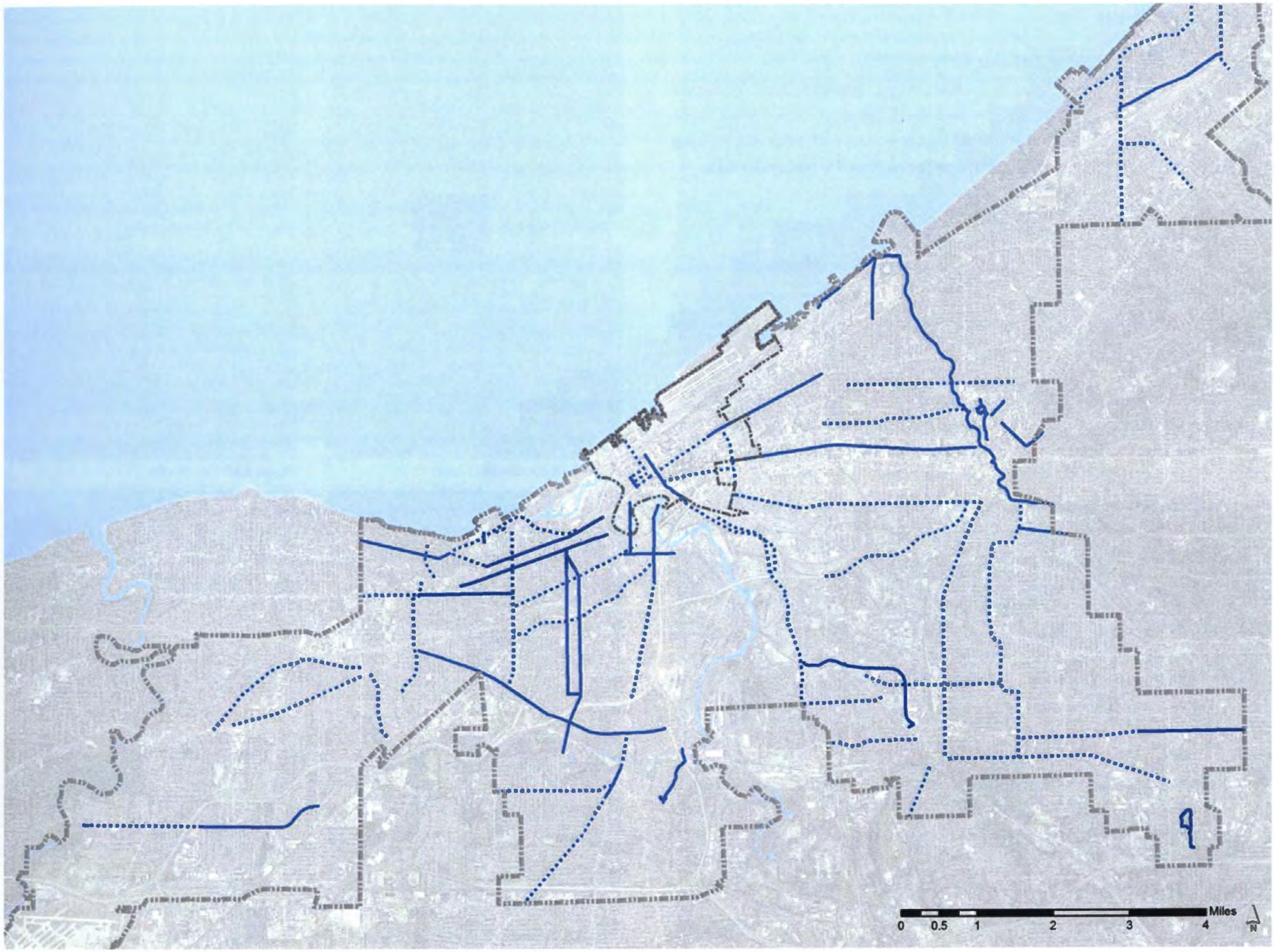


Figure 3.12: Existing and Proposed Bicycle Infrastructure

Site Inventory

Landmarks (Figure 3.13 and 3.17)
The City of Cleveland contains several historical and registered landmarks throughout the city and the downtown core. Since many of these locations serve as focal points or areas of interests, creating connections to these spaces via the proposed trail is highly desirable.

Hotels (Figure 3.14 and 3.18)
The proposed bicycle and pedestrian trail loop has the potential to promote tourist activities through the connection of landmarks, venues, restaurants, and other areas of interests. Connecting trail locations to downtown hotels allows visitors to easily access the trail to visit desired amenities.

Economic Zones (Figure 3.15 and 3.19)
While the trail will help to spur economic development in the surrounding areas, the trail must also connect to current retail and restaurant amenities.

Financial Zones (Figure 3.16 and 3.20)
Connecting to financial districts within the city center allows for easy travel to-and-from the workplace for those who work in these locations.

Bus Lines and Bus Stops (Figure 3.21 – 3.24)
Connecting to RTA bus routes and other transit lines allows people living in other neighborhoods to gain easy access to the downtown bicycle and pedestrian trail loop. This access then begins to create a greater alternative transportation system.

Public Parks (Figure 3.25 and 3.29)
Public parks serve an important function to residents of urban area, as they allow individuals to reconnect with the natural world and provide diverse recreational opportunities. It is important to connect to these amenities as one of the primary goals of this project is to enhance recreational quality for those who live and work in the downtown community.


Figure 3.13: Downtown Landmarks

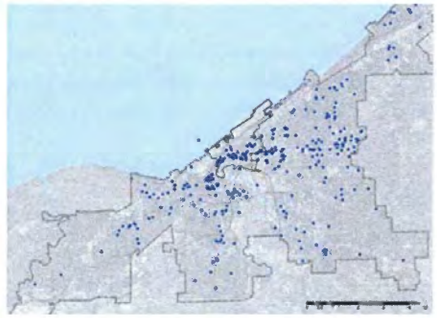


Figure 3.17: City Landmarks


Figure 3.14: Downtown Hotels

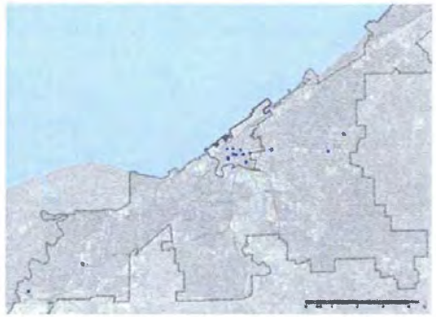


Figure 3.18: City Hotels


Figure 3.15: Downtown Economic Zones

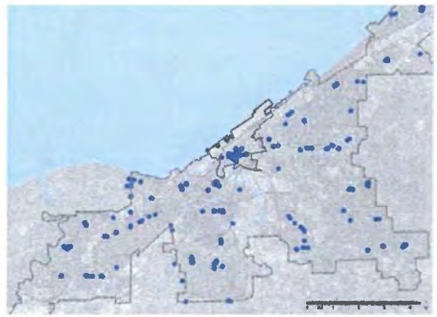


Figure 3.19: City Economic Zones


Figure 3.16: Downtown Financial Zones

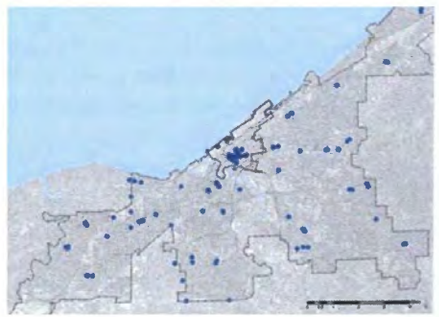


Figure 3.20: City Financial Zones

Figure 3.21: Downtown Bus Lines

Figure 3.22: Downtown Bus Stops

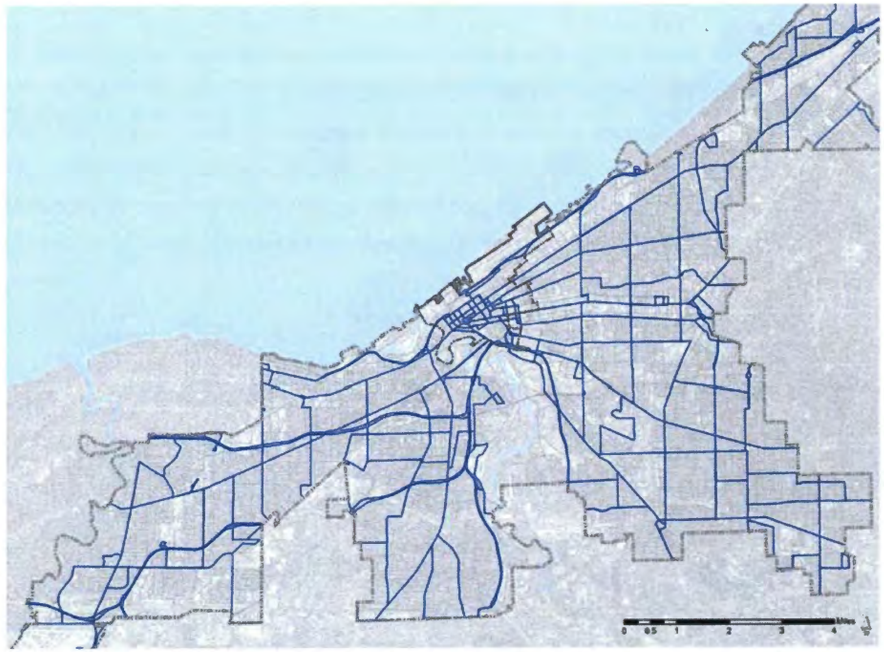


Figure 3.23: City Bus Lines

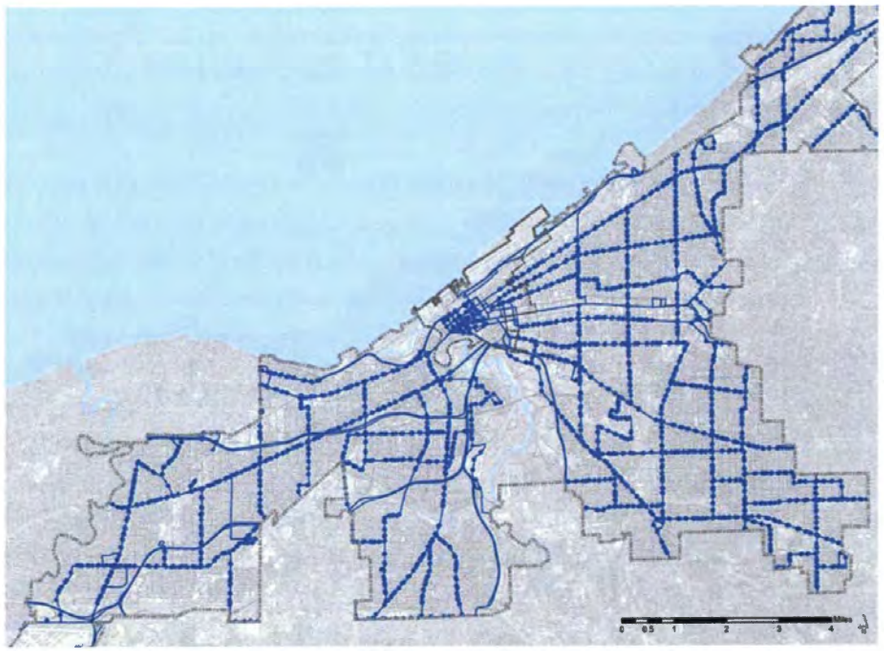


Figure 3.24: City Bus Stops

Site Inventory

Vacant Properties (Figure 3.26 and 3.30)
Most often, underutilized or vacant properties serve as the basis for economic development. In order to determine economic development potential, these properties need to be accounted for when determining the layout of the bicycle and pedestrian trail loop.

Zagster Locations (Figure 3.27 and 3.31)
Currently locations of the Zagster bike-sharing can give one an understanding of potential bicycle routes and throughways. Currently locations must be considered when determining the layout of the trail; however, once the trail is implemented, additional locations should be suggested.

Threat to Safety (Figure 3.28 and 3.32)
The psychological threat to safety is often a barrier that limits new cyclists for attempting new routes and fully joining the cycling culture. The two maps as referenced signify the locations of vehicular and pedestrian interaction in the downtown core and in the City of Cleveland. This demonstrates the threat to safety that exists within the city, signifying design measures must be established in order further protect cyclists and pedestrians in the right-of-way.

Speed Limit (Figure 3.33 and 3.35)
Street speed limits can heavily impact streetscape safety. Speed can impair reaction times and judgement, increasing the potential for negative interaction between cyclists, pedestrian, and automobiles. Streets with lower speed limits are more favorable in this study than streets with higher allowances.

Bicycle Priority Network (Figure 3.34 and 3.36)
Outside organization have begun to recognize the need for bicycle infrastructure and have developed a series of suggested prioritized bicycle zones in the city. While few of these zones contain bicycle infrastructure, this priority networks must be considered for future trail development.


Figure 3.25: Downtown Public Parks


Figure 3.29: City Parks


Figure 3.26: Downtown Vacant Properties

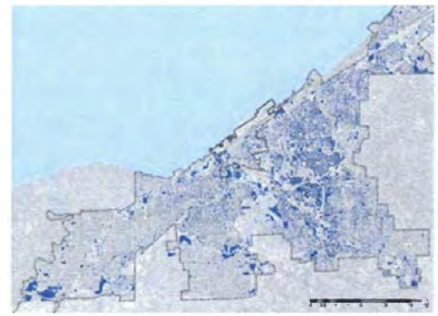


Figure 3.30: City Vacant Properties


Figure 3.27: Downtown Zagster Locations

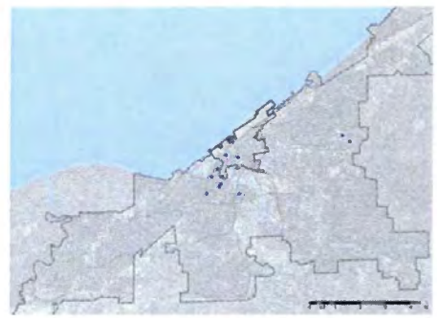


Figure 3.31: City Zagster Locations


Figure 3.28: Downtown Threat to Safety

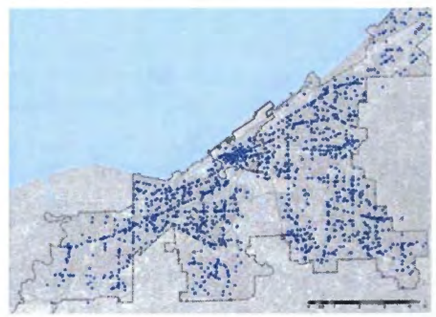


Figure 3.32: City Threat to Safety

Figure 3.33: Downtown Speed Limits

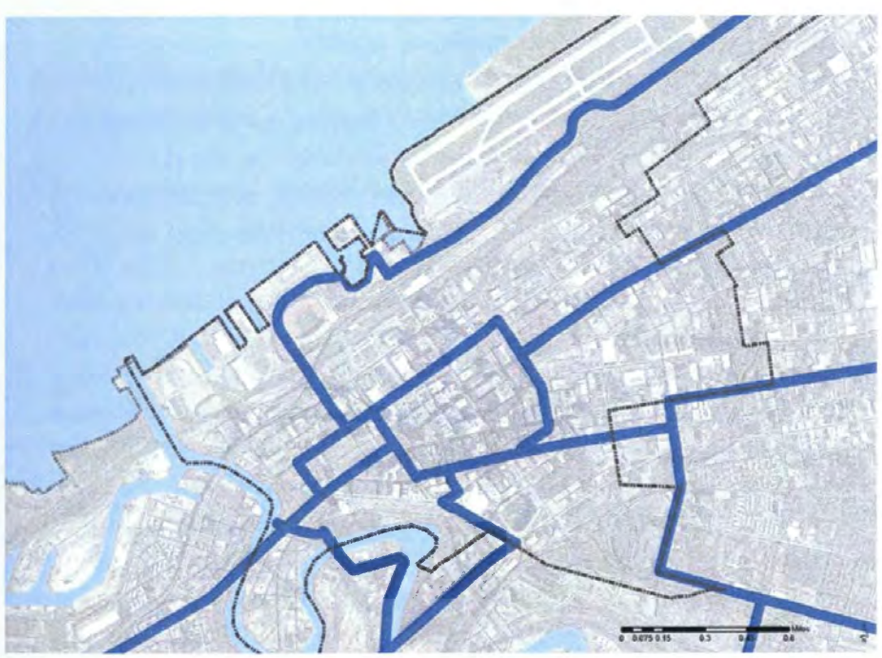


Figure 3.34: Downtown Priority Bike Network

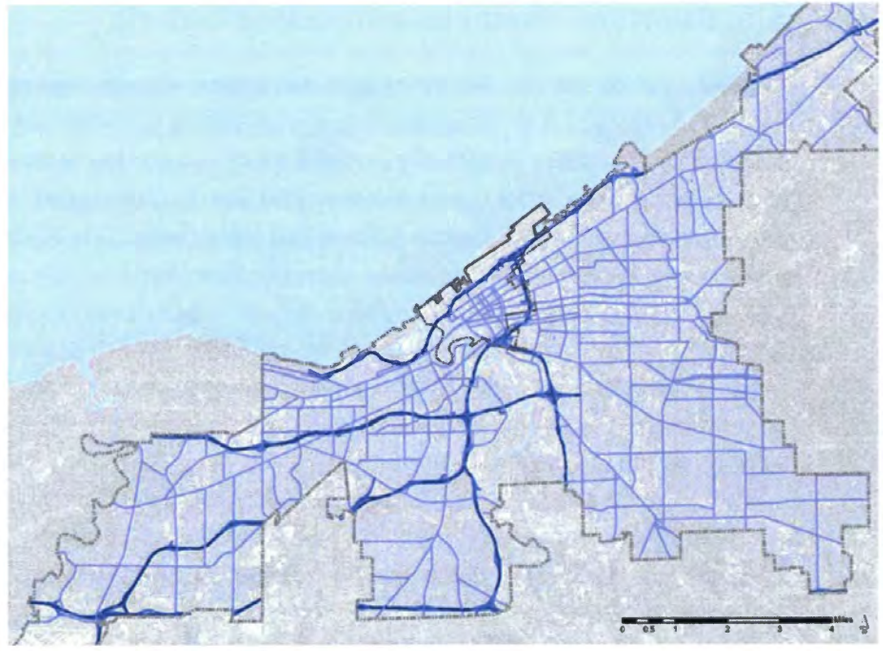


Figure 3.35: City Speed Limits

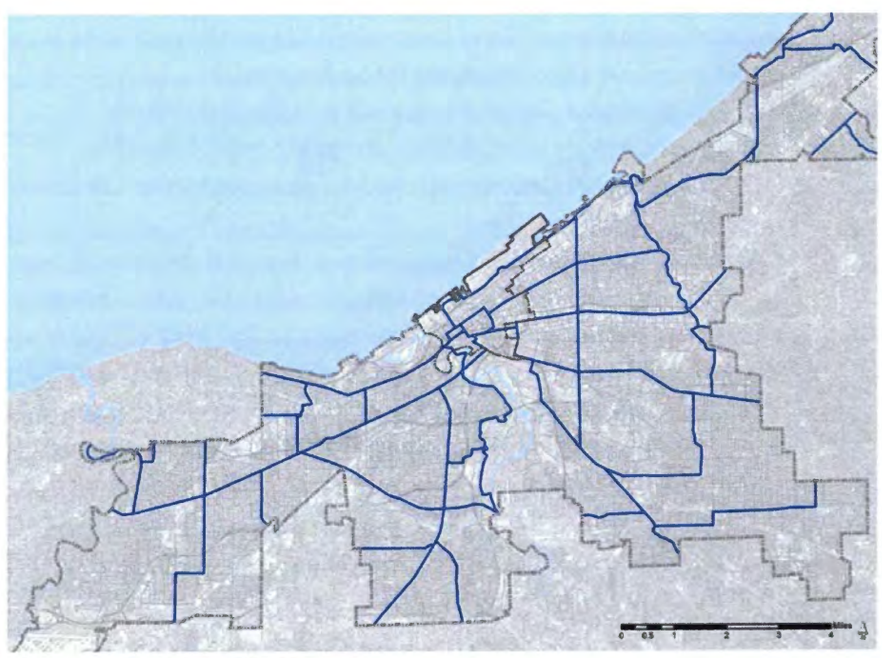


Figure 3.36: City Priority Bike Network

Site Analysis - Predictive Modeling Criteria

Connections to Bicycle Facilities and Amenities: When creating a trail loop system, it is important to consider bicycle infrastructure, facilities, and amenities already in place. Currently, the city has several Zagster bike-share locations and other amenities that users can utilize.

- *Streets with Bicycle Facilities / Amenities:* High Priority
- *Streets without Bicycle Facilities / Amenities:* Considered

Connections to Landmarks: The City of Cleveland has several historical landmarks that serve as monuments to the area's diverse history. In many respects, these locations serve as local tourist destinations and serve as an educational tool to those visiting them.

- Streets with Historical / Natural Landmarks: Highly Favorable
- Streets without Historical / Natural Landmarks: Considered

Connections to Trails / Bike Lanes: Incorporating additional trail system with the proposed bicycle and pedestrian trail loop allows more users to utilize the system. Additionally, connecting to established bicycle infrastructure allows visitors to reach locations that may not be included in the proposed trail loop system. Separated trails, bike lanes, and sharrows are all considered in the rankings below.

- *Streets that Connect to Separated-Trails:* Highly Favorable
- *Streets that Connect to Bike Lanes and Sharrows:* Favorable
- *Streets Not Connecting to Established Bike Infrastructure:* Considered

Connections to Regional Destinations: Regional destinations serve as traditional family and tourist destinations in the area. Examples of regional destinations include the Rock and Roll Hall of Fame and Museum, the Great Lakes Science Center, and the Cleveland Metroparks Zoo. Rankings for connecting to these amenities are shown below.

- *Streets that Connect to Regional Destinations:* Highly Favorable
- *Streets that Do Not Connect to Regional Destinations:* Considered

Connections to Regional Transit Amenities: The Greater Cleveland Regional Transit Authority (RTA) provides public bus, rapid transit (rail and bus), and trolley service to the people of Cuyahoga County. The RTA system encourages bike use and provides amenities to accommodate cyclists. All RTA buses are equipped with three-position bike racks on the front of the bus. This allows individuals from farther locations to combine multiple forms of alternative transportation to effectively transport them to-and-from the city. For this reason, connections to local alternative transit systems must be considered. Rankings for each system and connection can be seen below.

- *Connections to Bus Stops and Bus Transit:* High Priority
- *Connections to Rail Rapid Transit:* High Priority / Favorable
- *Connections to Trolley Stops:* No Priority (No Facilities)
- *Streets without Connections to Transit Stops:* No Priority

Recreational Dead Zones: As with many large cities, there are several areas that do not have adequate access to parks space or recreation. In this instance, all streets will be considered; however, recreational dead zones will be given a higher priority.

- *Recreation Dead Zones:* High Priority / Highly Favorable
- *Zones with Access to Recreation:* Favorable / Considered

Average Daily Traffic (ADT) / Motor Vehicle Use: According to the Seattle Bicycle Master Plan, bicycle and pedestrian safety is directly related to the number of vehicles, bicycles, and pedestrians on the urban street. While an increase in alternative transportation will allow motorist to gain awareness of cycling habits, likely limit cyclist and pedestrian casualties, ADT counts need to be accounted for when considering eligible streets for an urban trail. These counts will heavily influence street crossings, a vulnerable situation for urban cyclists. Rankings for ADT counts can be seen below.

- *Low ADT Counts (Less Than 5,000):* Extremely Favorable
- *Moderately Low ADT Counts (5,001-10,000):* Highly Favorable
- *Moderate ADT Counts (10,001-20,000):* Favorable
- *Moderately High ADT Counts (20,001-40,000):* Highly Unfavored

- *High ADT Counts (40,000 or More)*: Not Considered
- *No Data:* Considered

Drives / Driveways: Driveways, parking lot entrances, and minor alleyways provide a unique challenge for motorists and cyclists as they often provide an unexpected zone of conflict. A higher number of drives along the streetscape can drastically increase the risk to safety for pedestrians and cyclists. The following rankings concerning driveways were used when determining the route for the bicycle and pedestrian trail loop. These numbers reflect the number of drives between two major or minor cross-streets.

- *Zero Drives Between Cross-Streets*: Extremely Favorable
- *Minimal (1-2) Drives Between Cross-Streets:* Highly Favorable
- *Few Drives (3-5) Between Cross-Streets*: Favorable
- *Several Drives (6 or More) Between Cross-Streets*: Unfavorable

Impact to Current Traffic Patterns: The addition of elements to the right-of-way can cause changes to traffic patterns and lane assignments. While this project aims to create a bicycle and pedestrian trail loop, it does not strive to drastically alter traffic patterns and lane assignments in order to keep necessary roadway requirements for peak traffic hours. For this reason streets that only require minor changes to present lane assignments will be more likely considered than streets that require major traffic changes in order to accommodate for a trail system.

- *Streets that Require No Change to Lanes:* Highly Favorable
- *Streets that Require a Narrowing of Present Lanes:* Highly Favorable
- *Streets that Require the Retrofitting of One Parking Lane:* Favorable
- *Streets that Require the Retrofitting of Two Parking Lanes:* Considered
- *Streets that Require the Retrofitting of One Travel Lane:* Considered
- *Streets that Require the Retrofitting of Two Lanes:* Not Favorable
- *Streets that Require the Retrofitting of Three + Lanes:* Not Considered

Intersections / Ramps: Intersections and ramps can pose a great threat to cyclists and pedestrians, as the orientation of streets at intersections and the placement of cyclists can cause visibility issues towards the most vulnerable users. According to the Minnesota Department of Natural Resources, cross-streets with varying speeds require different treatments at the intersection. In general, streets with higher speed limits need a greater separation of the two user groups. The following rankings were used to determine potential streets for the loop system:

- *Cross-Streets with Speeds Less or Equal to 25 mph*: Highly Favorable
- *Cross-Streets with Speeds Between 26 and 35 mph*: Adequate
- *Cross-Streets with Speeds Greater or Equal to 36 mph:* Unfavorable
- *On-Ramp / Off-Ramp Merges* – Unfavorable

Right-of-Way Specifications: As previously mentioned in the impact to current traffic patterns section, the inclusion of a bicycle and pedestrian trail system can cause changes to traffic patterns and lane assignments. In order for a streetscape to be considered, minimum right-of-way specifications must be met. These specifications must be adjusted per number of lanes (11' lanes if can be narrowed, 12' otherwise). These minimum right-of-way specifications are listed below.

- *Right-of-Way Minimum for Option One (Two Traffic Lanes):* 46'
- *Right-of-Way Minimum for Option Two (Two Traffic Lanes):* 45'

Speed Limits: Vehicular speed limits have a direct correlation with potential risks to the safety of pedestrians and cyclists using alternative right-of-way transportation amenities. The higher the speed limit decreases the driver's peripheral vision, causing the stopping distance, crash risk, and fatality risk, to increase. The following speed limits were considered when determining potential streets for the trail system. Slower speed limits were ranked higher as they provide the highest degree of safety for pedestrians and cyclists.

- *Speeds Less or Equal to 25 mph*: Highly Favorable
- *Speeds Between 26 and 35 mph:* Adequate / Acceptable
- *Speeds Greater or Equal to 36 mph*: Unfavorable

Predictive Modeling

Definition

When confined to spatial qualities, predictive modeling (also referred to as predictive analysis of geospatial predictive modeling) states that occurrences of events or factors are not random in distribution; however, spatial environmental factors (such as infrastructure, economic factors, etc.) constrain and influence locations in which events are likely to occur and develop. This process allows data trends to be displayed in order to help dictate a favorable outcome.

Process

Determining potential streets for the downtown bicycle and pedestrian trail loop requires a thorough analysis of compiled dated. Relevant GIS data pertaining to streetscape safety, location of amenities, alternative transportation, and other desirable qualities were utilized in this process. Each of these information points was ranked upon a point value system, with more desirable qualities given a higher value over less desirable qualities. Each of these files was converted to a raster system and then combined to form a predictive model. This simulation produces maps that visually begin to highlight areas of higher potential for the bicycle and pedestrian trail loop based on the rankings of the input data. Areas that have a higher added point value show more favorably while lower point values do not display prominently on the map. This gives this project a narrow selection of streets to look at when entering the conceptual design phase of this project.

Each of the maps to the right shows the initial results of the predictive model. When looking at figure 3.37, one can begin to see patterns develop where multiple data points intersect. In figure 3.38, this study is overlayed with steets in order to determine the location of the prominent areas.

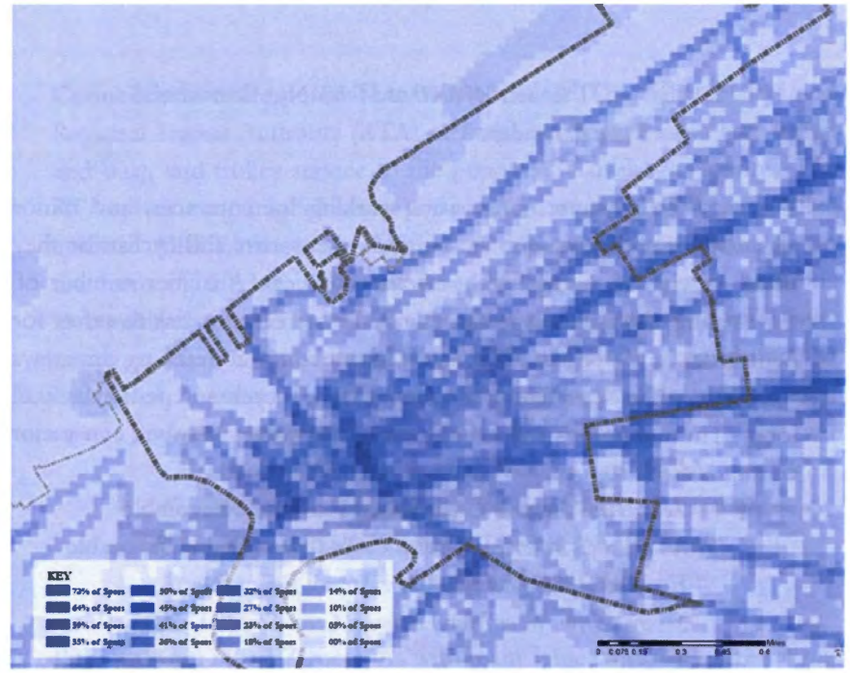


Figure 3.37: Downtown Full Predictive Model

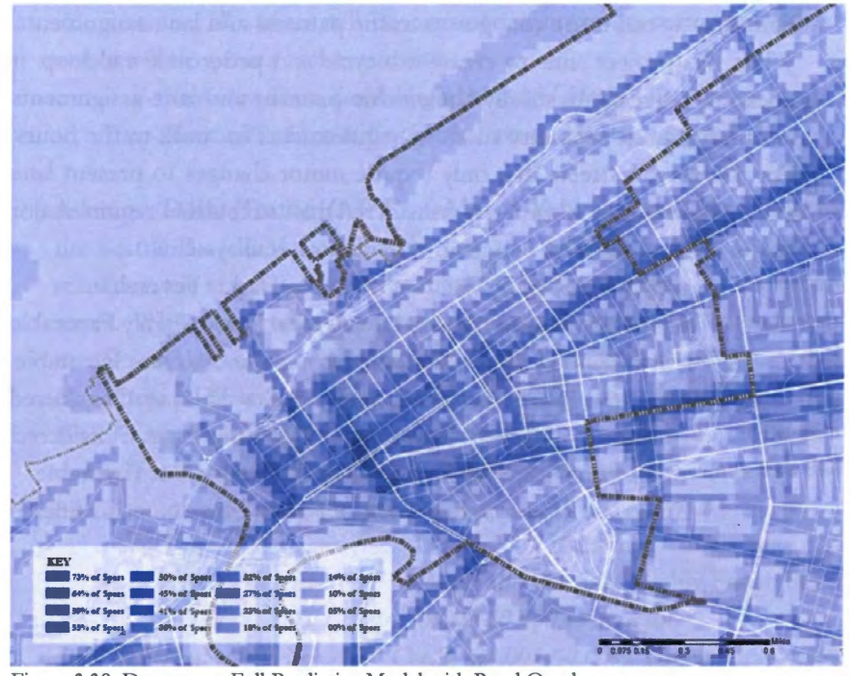


Figure 3.38: Downtown Full Predictive Model with Road Overlay

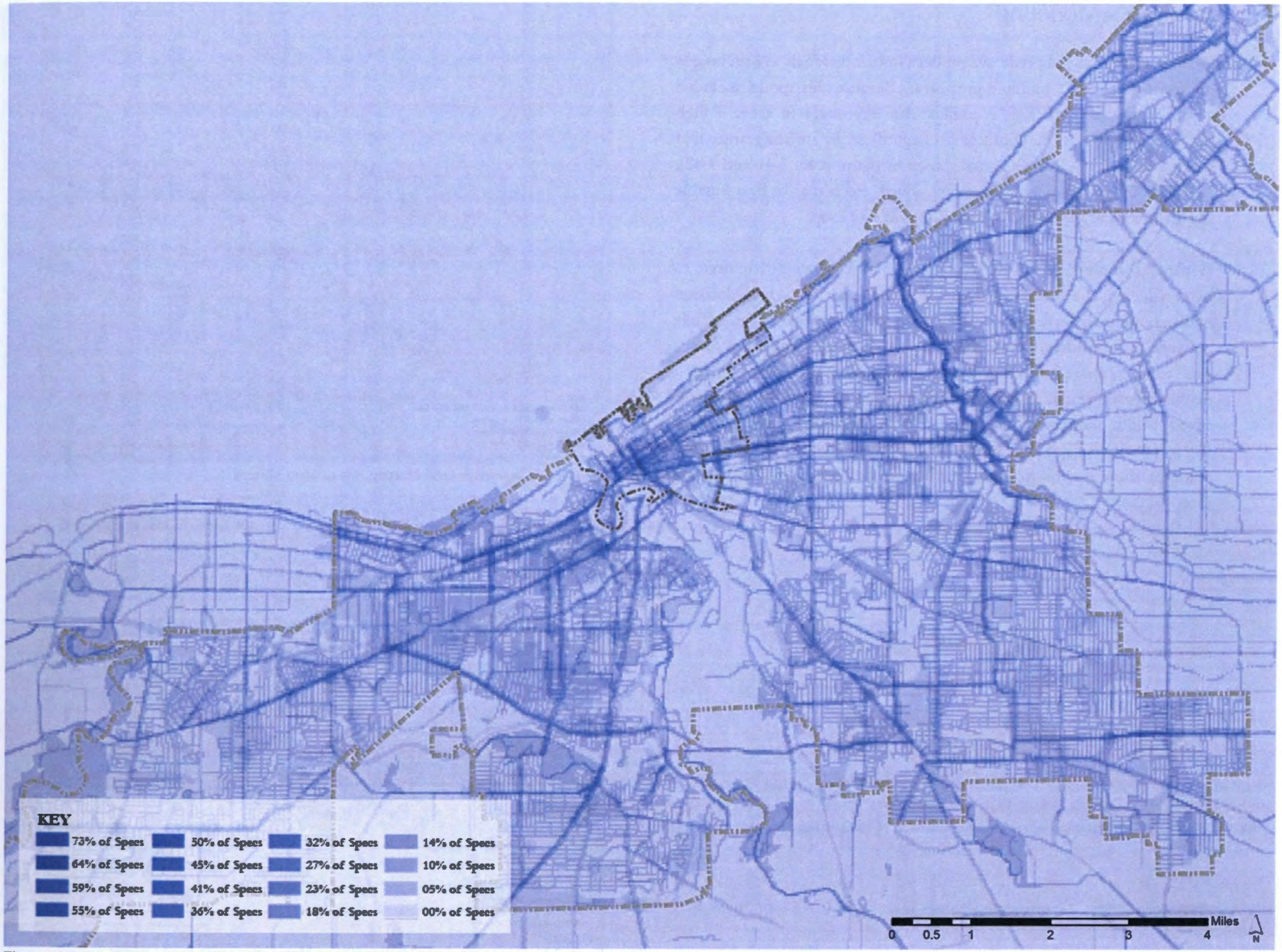


Figure 3.39: Full City Predictive Model

Predictive Modeling

Further analysis of the predictive model allows individuals to gain insight on streets that serve multiple purposes. Because this model included a wide range of criteria, it is unlikely for any street to score a high percentage based on the input data. Regardless, by isolating areas that score a value of at least 30% (as shown in figure 3.40, 3.41 and 3.42), analysists are able to quickly determine which streets may be best suitable for the inclusion of a bicycle and pedestrian trail loop.

While this study successfully isolates several key streets that need to be considered, the predictive model does not serve as a final decision maker, but merely serves as a starting point for conceptual design. While between ten and fifteen items were included in the model, these results need to be compared with additional criteria that are not able to function in this type of study. Some of these additional criteria include right-of-way width, number of drive intersections, and daily traffic patterns. Even if a particular street scores well in the predictive model, failure abide by these criteria may prevent it from being included in the trail loop system.

Figure 3.40: Downtown Areas Meeting 30% or More Criteria

Figure 3.41: Downtown Areas Meeting 30% or More Criteria with Road Overlay

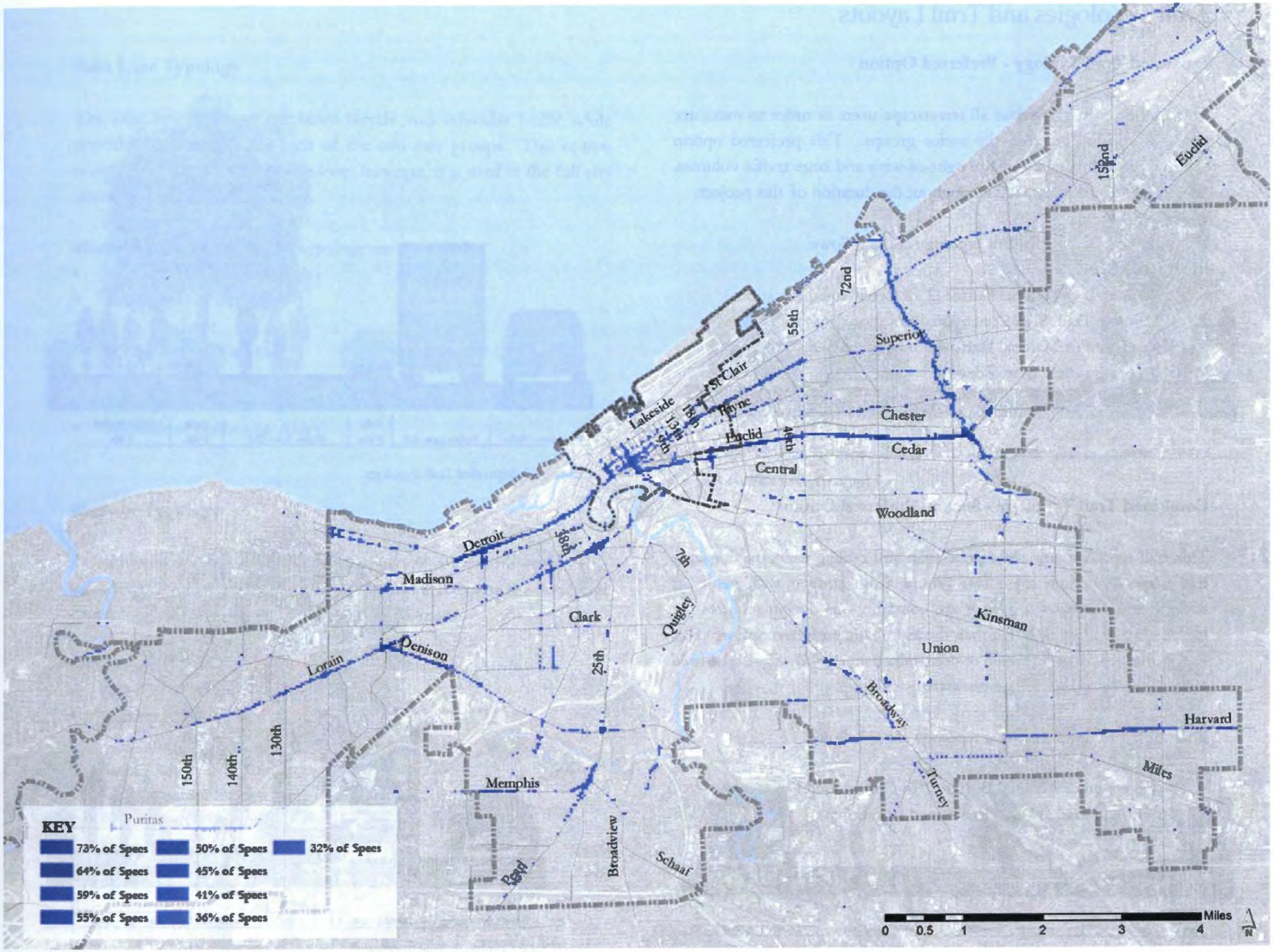


Figure 3.42: City Areas Meeting 30% or More Criteria with Road Overlay

Trail Typologies and Trail Layouts

Separated Trail Typlogy - Preferred Option

This trail typology separates all streetscape users in order to minimize potential conflict between the varius groups. This preferred option works well on streets with large right-of-ways and large traffic volumes. This scenario will be utilized throughout the duration of this project.

Minimum dimensions for this typology are as follows:

- Road / Lanes (Variable)
- 3' Vegetated or Material Buffer (2' in Constrained Locations)
- 12' Bicycle Trail (8' in Constrained Locations)
- 3' Vegetated or Material Buffer (2' in Constrained Locations)
- 5' Minimum Pedestrian Sidewalk

Figure 3.43: Separated Trail Typology

Combined Trail Typology - Second Preferred Option

This trail typology combines pedestrian and cycling users on the same trail while separating these two groups from conflict with vehicular traffic. Since these two groups are combine, this option requires the bicycle trail itself to be larger than the trail in the preferred option. This trail works well in less traveled or constrained areas, and will also be used int he downtown bicycle and pedestrian trail loop.

Minimum dimensions for this typology are as follows:

- Road / Lanes (Variable)
- 3' Vegetated or Material Buffer (2' in Constrained Locations)
- 16' Bicycle Trail (12' in Constrained Locations)

Figure 3.44: Combined Trail Typology

Bike Lane Typology

The bike lane typology combines bicycle and vehicular traffic while provide separate lanes for each of the two user groups. This option is not be used in the downtown loop; however, it is used in the full city framework plan.

Minimum dimensions for this typology are as follows:

- Sidewalk or Buffers (if Able)
- Parking Lane (Optional)
- 5' Bicycle Lane
- Road / Lanes (Variable)
- 5' Bicycle Lane
- Parking Lane (Optional)
- Sidewalk or Buffers (if Able)

Figure 3.45: Bike Lane Typology

Sharrow Typology

The sharrow typology combines bicycle and vehicular traffic in the same travel lane. Sharrows are often street markings that dictate the preferend location for the rider to be seen by other motorists.

Minimum dimensions for this typology are as follows:

- Sidewalk or Buffers (if Able)
- Parking Lane (Optional)
- 12' Minimum Sharrow Lane
- Road / Lanes (Variable)
- 12' Minimum Sharrow Lane
- Parking Lane (Optional)
- Sidewalk or Buffers (if Able)

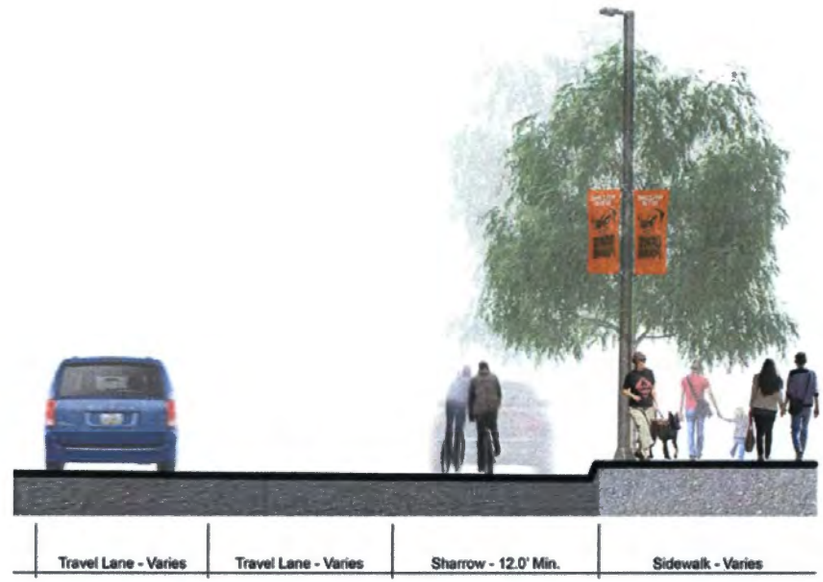


Figure 3.46: Sharrow Typology

Conceptual Design and Process

Further determining potential streets in the conceptual design utilized information collected from the predictive model and from additional outside sources that could not be included in the GIS analysis. Initial streets were chosen from the model; however, street eligibility was further confirmed or denied upon comparing it with the additional data. This information included available right-of-way space (width), potential for vehicle and pedestrian conflict (drives, alleys, and intersections), and availability to connect to other bicycle routes. In many instances, many streets deemed acceptable in the model were eliminated due to these additional outside influences. Overall, this process formed the basis for the final route of the bicycle and pedestrian trail loop. A brief description of each of the concepts can be seen below:

- **Concept One (Figure 3.47):** This concept aims to keep the trail localized in the center of downtown. This concept was altered as many streets on the eastern portion cannot fit a trail in the right-of-way.

- **Concept Two (Figure 3.48)**: This concept brings the trail farther east to streets with a wider right-of-way. This concept utilizes two trails on southern portion for ease of transportation purposes.

- **Concept Three (Figure 3.49):** This concept extends on of the trails to incorporated additional amenities.

- **Concept Four (Figure 3.50) :** This concept eliminates the two trail system in order to create a singular loop in the system.

- **Concept Five (Figure 3.51):** This concept reintroduces a small second trail on the eastern portion of the site; however, this idea is quickly abandoned.

- **Concept Six (Figure 3.52)**: This is the final concept for the trail and serves and as current reiteration of the plan.

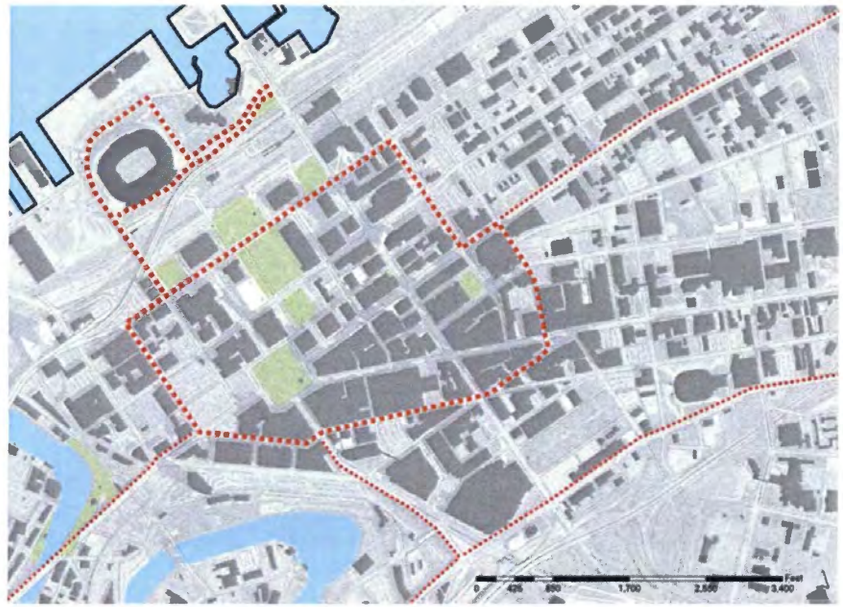


Figure 3.47: Concept One

Figure 3.48: Concept Two

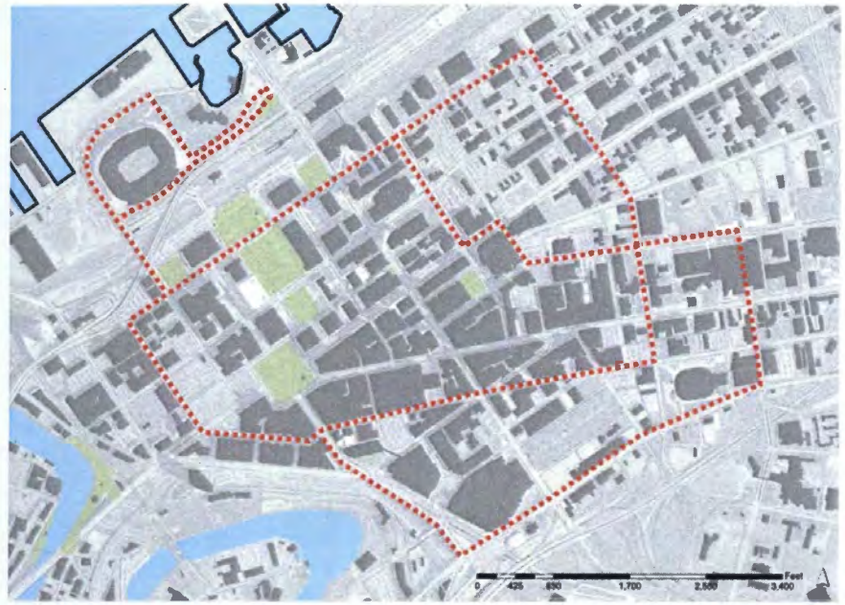


Figure 3.49: Concept Three

Figure 3.50: Concept Four

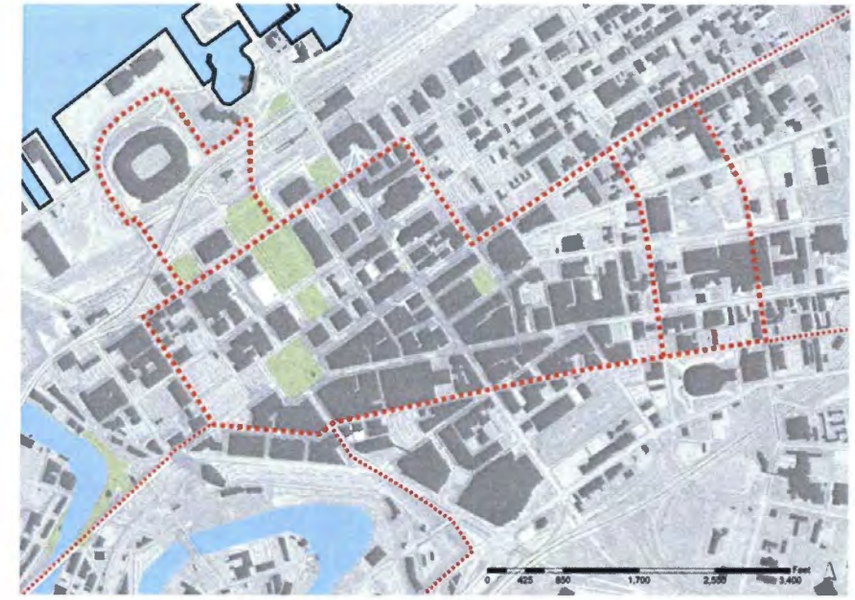


Figure 3.51: Concept Five

Figure 3.52: Concept Six

Downtown Bicycle and Pedestrian Trail Loop Framework Plan

Overview

The downtown bicycle and pedestrian trail loop system utilizes information from the predictive model, additional analytic criteria (right-of-way width, number of drives, etc.), and trail typology guidelines to determine an appropriate path for this network. This system connects key landmarks and destinations within the city while also allowing for economic development for underutilized portions of the downtown neighborhood. This layout utilizes portions of Superior Avenue, East 12th Street, Lakeside Avenue, West 6th Street, Prospect Avenue, and East 22nd Street, as these right-of-ways allow for the accommodation of the preferred separated trail use typology. This dimensional layout allows for the isolation of each user group, enhancing public safety for all individuals who wish to use this network.

In addition to creating a main trail, this framework concept also contains a small lakefront route along West 3rd Street and Erieside Avenue. This lakeside spur makes use of the second trail option and combines pedestrian and bicycle traffic while separating it from vehicular congestion. Additionally, this route uses the proposed pedestrian bridge (slated to open in 2017), allowing for spectacular views of Lake Erie, the Rock and Roll Hall of Fame, and the Great Lakes Science Center. This additional link connects several tourist attractions to the main trail, strengthening its ability to attract a diverse population.

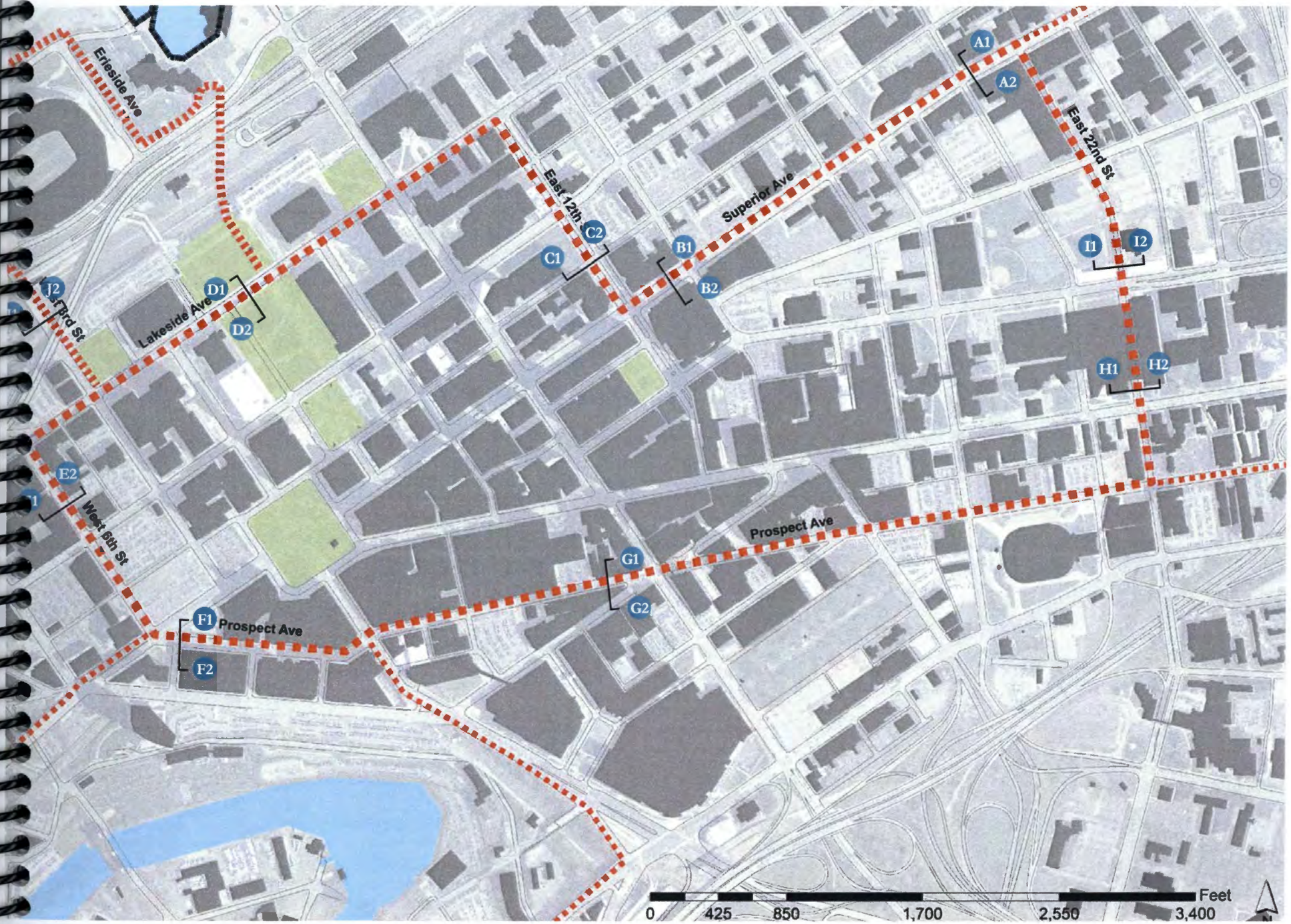
As each street presents its own challenges in accommodating the proposed bicycle and pedestrian trail loop, reconfiguration of each roadway need to be handled individual. Specifics and graphics on adjustments to each roadway are in the pages to follow.

Statistics

- Length of Main Trail (Miles): 3.54 Miles
- Length of Lakeside Spur Trail (Miles): 1.33 Miles

Section Information

Figure 3.53: Downtown Framework Plan


Erieside Ave
East 12th St
Superior Ave
East 22nd St
Lakeside Ave
West 3rd St
West 6th St
Prospect Ave
Prospect Ave
A1
A2
B1
B2
C1
C2
D1
D2
E2
F1
F2
G1
G2
H1
H2
I1
I2
J2
0
425
850
1,700
2,550
3,400
Feet

Downtown Bicycle and Pedestrian Trail Loop Framework Plan - Areas of Interest

Downtown Framework Plan – Areas of Interest

01. Great Lakes Science Center
02. First Energy Stadium (Figure 3.54)
03. Rock and Roll Hall of Fame (Figure 3.55)
04. Cleveland City Hall
05. The Galleria
06. Willard Pak
07. The Cleveland Convention Center
08. Cuyahoga County Common Pleas Court
09. The Cleveland Public Mall
10. East 4th Street (Figure 3.56)
11. Key Tower
12. Tower City
13. Cleveland RTA main rapid transit station.
14. Cleveland Horseshoe Casino
15. Quicken Loans Arena
16. Progressive Field
17. The Wolstien Center
18. The Hanna Theature
19. Cleveland State University (Figure 3.57)

Figure 3.54: First Energy Stadium

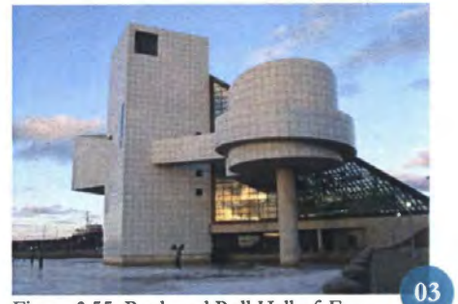
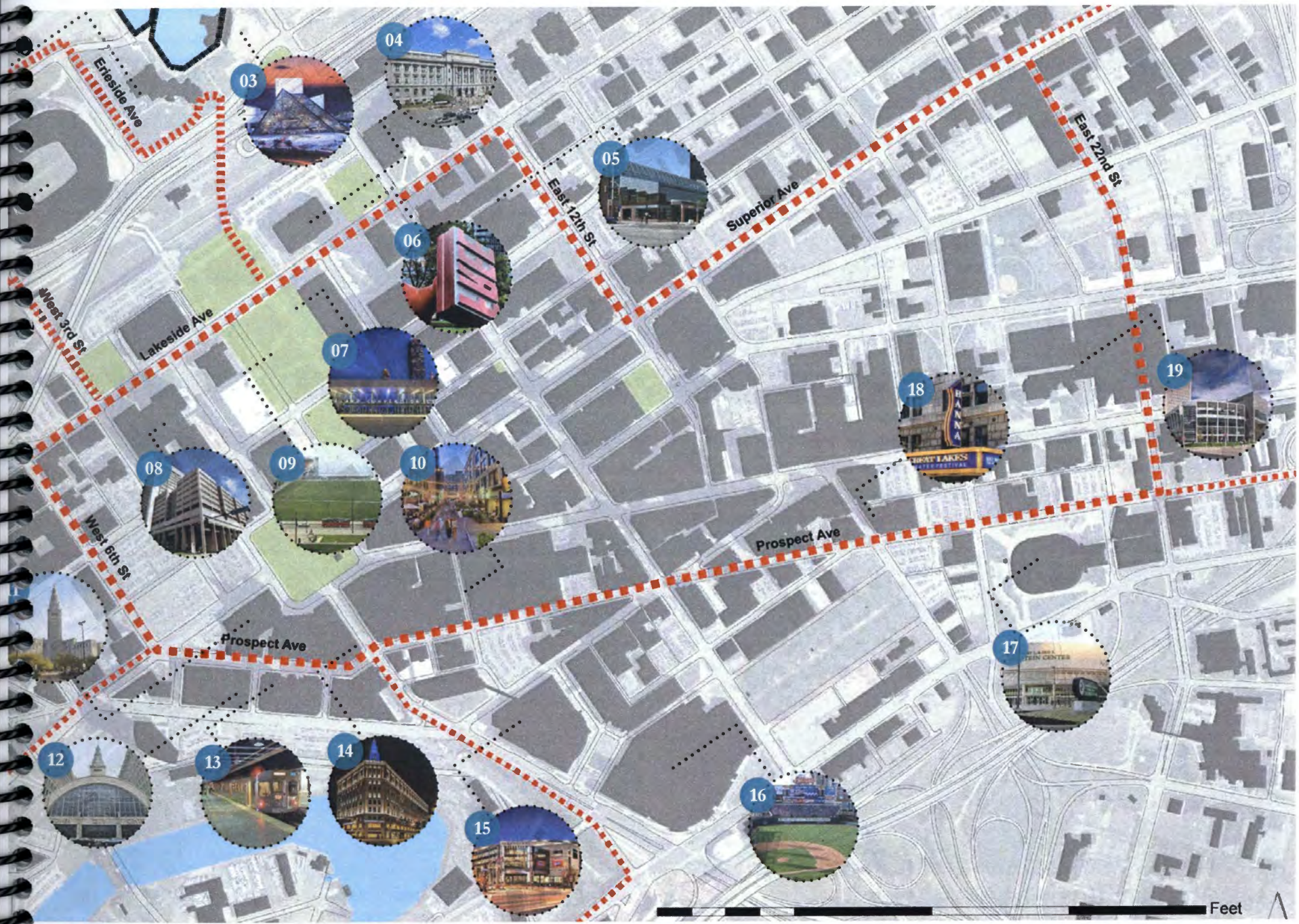


Figure 3.55: Rock and Roll Hall of Fame

Figure 3.56: East 4th Street

Figure 3.57: Cleveland State University

Figure 3.58: Downtown Framework Plan with A


Erieside Ave
West 3rd St
Lakeside Ave
East 12th St
Superior Ave
East 22nd St
West 6th St
Prospect Ave
Prospect Ave
Feet
03
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19

of Interest

Downtown Bicycle and Pedestrian Trail Loop Section- Superior Ave Between East 21st St and East 22nd St

Existing Streetscape Condition

Superior Avenue between East 21st Street and East 22nd Street has a high potential for the inclusion of a separated bicycle and pedestrian trail loop system. This street contains a wide right-of-way (135 feet) and contains a high amount of vehicular and bus traffic as in serves as a major route for the Cleveland RTA. This street serves a central focus to the city, as it also intersects Public Square. Currently this street contains bike lanes, on street parking, large sidewalks, bus shelters, and large plant beds. Much of the non-vehicular right-of-way space is underutilized and even neglected.

Proposed Changes

As Superior Avenue between East 21st Street and East 22nd Street contains enough available right-of-way space without altering the street, the inclusion of the bicycle and pedestrian trail loop on this portion of the corridor requires very little road modification. Much of the changes to the road itself include removing the previous bike lanes, restriping the street, and adding angled parking to the southern portion of the street in an attempt to use the underutilized space. On the northern portion of the streetscape, the plant bed and sidewalk dimensions are altered in order to accommodate for the new bicycle trail. Designed amenities are also added to this portion of the street in order to create a continuous aesthetic throughout the trail.

Statistics

- Right-of-Way Width (Feet): 135.00'
- Length of Trail on Street (Feet): 2,904 Feet
- Length of Trail on Street (Miles): .55 Miles
- Removal of Traffic or Parking Lanes: None

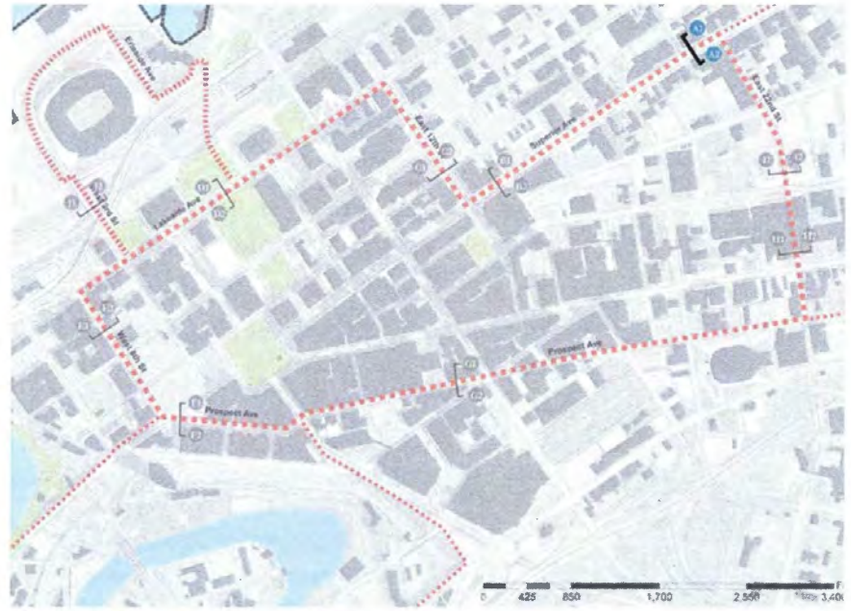


Figure 3.59: Downtown Framework Plan

Figure 3.60: Superior Ave Between East 21st and 22nd Zoomed-In Plan

Figure 3.61: Superior Ave Between East 21st and 22nd Existing Section

Figure 3.62: Superior Ave Between East 21st and 22nd Proposed Section

Downtown Bicycle and Pedestrian Trail Loop Section- Superior Ave Between East 12th St and East 13th St

Existing Streetscape Condition

Superior Avenue between East 12th Street and East 13th Street has a high potential for the inclusion of a separated bicycle and pedestrian trail loop system. This street contains a wide right-of-way (134 feet) and contains a high amount of vehicular and bus traffic as in serves as a major route for the Cleveland RTA. This street serves a central focus to the city, as it also intersects Public Square. Currently this street contains bus lanes, on street parking, large sidewalks, bus shelters, and large plant beds. Since this portion of the street is closer to the downtown core, the right-of-way is much more utilized than previous sections of Superior Avenue.

Proposed Changes

As Superior Avenue between East 12th Street and East 13th Street contains enough available right-of-way space without altering the street, the inclusion of the bicycle and pedestrian trail loop on this portion of the corridor no road modification. On the northern portion of the streetscape, the plant bed and sidewalk dimensions are altered in order to accommodate for the new bicycle trail. Designed amenities are also added to this portion of the street in order to create a continuous aesthetic throughout the trail.

Statistics

- Right-of-Way Width (Feet): 134.00'
- Length of Trail on Street (Feet): 2,904 Feet
- Length of Trail on Street (Miles): .55 Miles
- Removal of Traffic or Parking Lanes: None

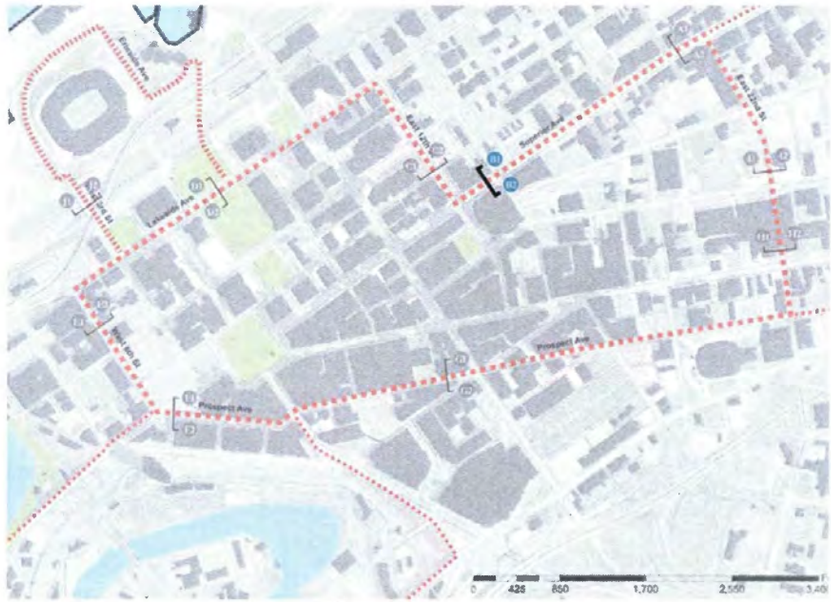


Figure 3.63: Downtown Framework Plan

Figure 3.64: Superior Avenue between East 12th and 13th Zoomed-In Plan

Figure 3.65: Superior Avenue between East 12th and 13th Existing Section

Figure 3.66: Superior Avenue between East 12th and 13th Proposed Section

Downtown Bicycle and Pedestrian Trail Loop Section- East 12th St Between Rockwell Ave and St. Clair Ave

Existing Streetscape Condition

East 12th Street between Rockwell Avenue and St. Clair Avenue has a high potential for the inclusion of a separated bicycle and pedestrian trail loop system. This street contains a large right-of-way (140 feet) and primarily connects users to high-rise residential and office destinations. Currently this street contains large sidewalks, large plant beds, street trees, angled parking, bus lanes, and a median buffer. In many respects, this street contains many of the complete street elements with the exception of a bike lane or trail.

Proposed Changes

As East 12th Street between Rockwell Avenue and St. Clair Avenue contains enough available right-of-way space without altering the street, the inclusion of the bicycle and pedestrian trail loop on this portion of the corridor no road modification. On the northern portion of the streetscape, the plant bed and sidewalk dimensions are altered in order to accommodate for the new bicycle trail. Designed amenities are also added to this portion of the street in order to create a continuous aesthetic throughout the trail.

Statistics

- Right-of-Way Width (Feet): 140.00'
- Length of Trail on Street (Feet): 1,478 Feet
- Length of Trail on Street (Miles): .28 Miles
- Removal of Traffic or Parking Lanes: None

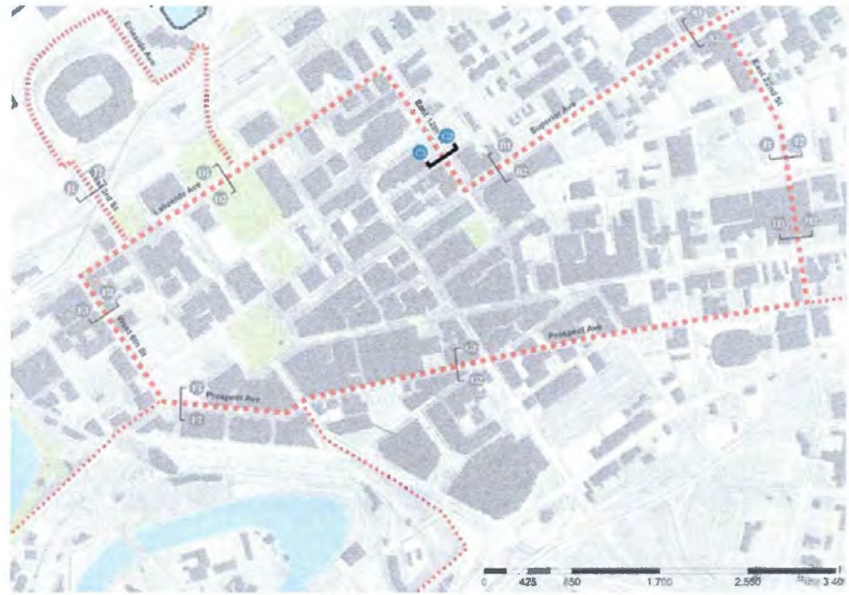


Figure 3.67: Downtown Framework Plan

Figure 3.68: East 12th Street between Rockwell Ave and St. Clair Ave Zoomed-In Plan

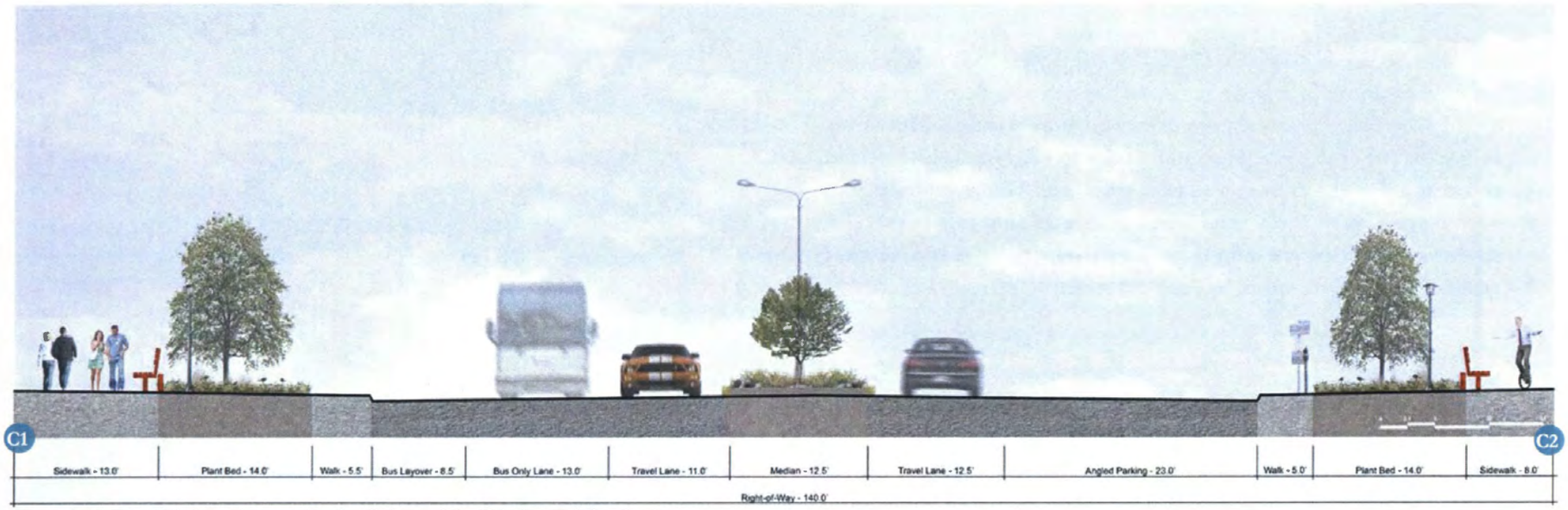


Figure 3.69: East 12th Street between Rockwell Ave and St. Clair Ave Existing Section

Figure 3.70: East 12th Street between Rockwell Ave and St. Clair Proposed Section

Downtown Bicycle and Pedestrian Trail Loop Section- Lakeside Ave Between West Mall Dr and East Mall Dr

Existing Streetscape Condition

Lakeside Avenue between East Mall Drive and West Mall drive has the potential for the inclusion of a separated bicycle and pedestrian trail loop system with minor adjustments to the present infrastructure. This serves as the last major non-interstate route prior to reaching Lake Erie and connects individuals with several local amenities. This street contains a large right-of-way (99 feet) and contains large 20 foot sidewalks. This street contains no bicycle infrastructure and contains few complete street qualities such as street trees, buffers, and seating elements.

Proposed Changes

Lakeside Avenue between East Mall Drive and West Mall nearly contains enough available right-of-way space for the inclusion of the bicycle and pedestrian trail loop on this portion. For this reason only minor modifications to the streetscape are made. On the southern portion of the road, the interchangeable parking / travel lane is removed to create enough space for the accommodation of the trail. Designed amenities are also added to this portion of the street in order to create a continuous aesthetic throughout the trail.

Statistics

- Right-of-Way Width (Feet): 99.00'
- Length of Trail on Street (Feet): 3,643 Feet
- Length of Trail on Street (Miles): .69 Miles
- Removal of Traffic or Parking Lanes: One Parking / Travel Lane

Figure 3.71: Downtown Framework Plan

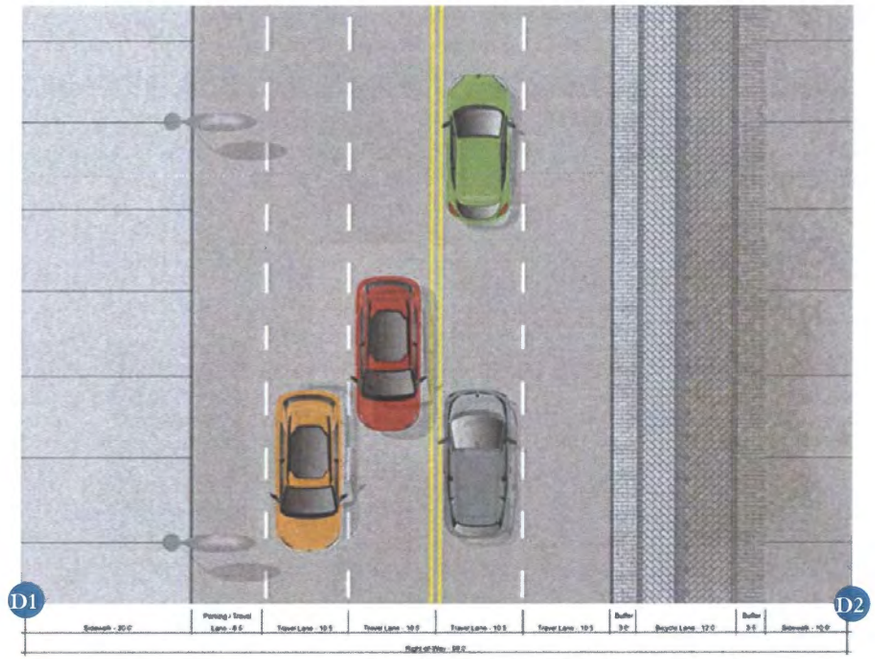


Figure 3.72: Lakeside Avenue between E Mall Dr and W Mall Dr Zoomed-In Plan

Figure 3.73: Lakeside Avenue between E Mall Dr and W Mall Dr Existing Section

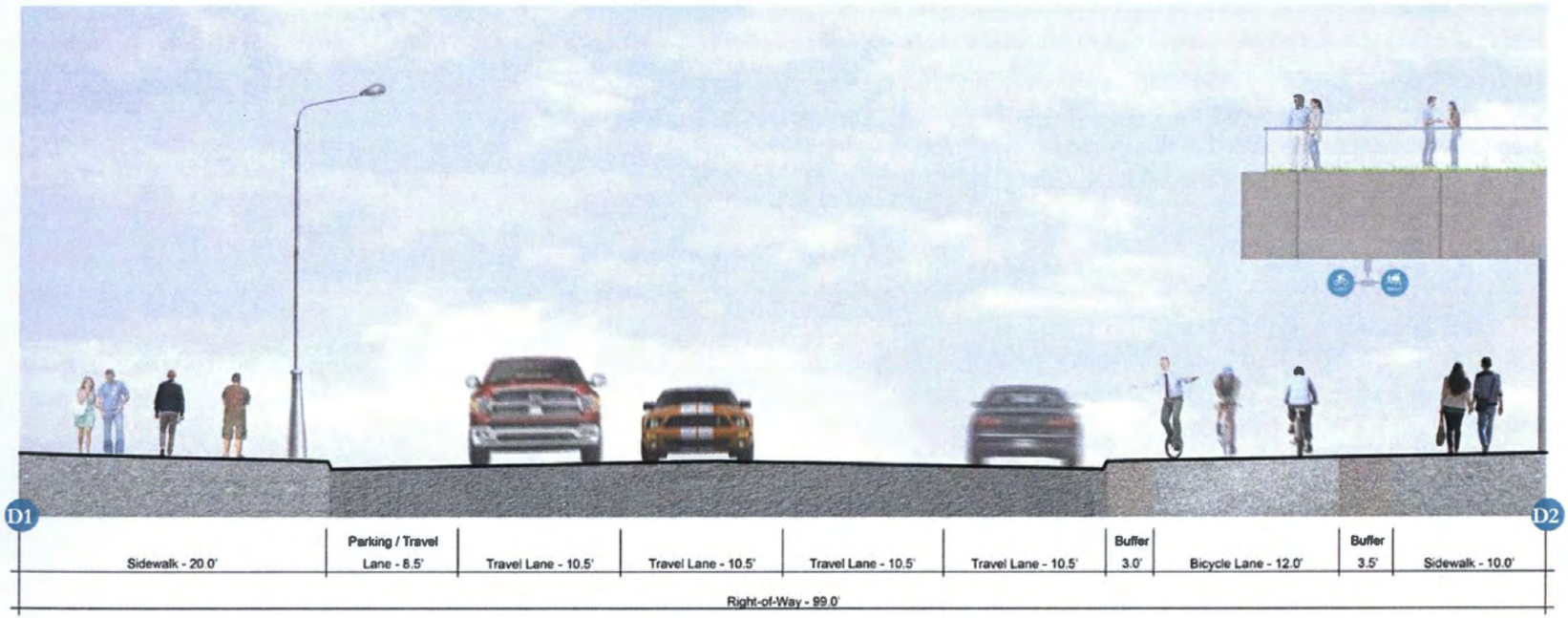


Figure 3.74: Lakeside Avenue between E Mall Dr and W Mall Dr Proposed Section

Downtown Bicycle and Pedestrian Trail Loop Section- West 6th St Between St. Clair Ave and Johnson Ct

Existing Streetscape Condition

West 6th Street between St. Clair Avenue and Johnson Court has the potential for the inclusion of a separated bicycle and pedestrian trail loop system with minor adjustments to the present infrastructure. This street contains a large right-of-way (99 feet) and serves as a cultural destination for the downtown community. Currently this street contains large sidewalks s, large plant beds, street trees, parallel parking, bike sharing, and bicycle parking. In many respects, this street contains many of the complete street elements with the exception of a bike lane or trail.

Proposed Changes

West 6th Street between St. Clair Avenue and Johnson Court nearly contains enough available right-of-way space for the inclusion of the bicycle and pedestrian trail loop on this portion. For this reason only minor modifications to the streetscape are made. Each lane on the roadway is dieted in order to add several feet of additional space on the eastern portion of the street. This moves the east curb towards the road center line, creating enough space for the accommodation of the trail. Designed amenities are also added to this portion of the street in order to create a continuous aesthetic throughout the trail.

Statistics

- Right-of-Way Width (Feet): 99.00'
- Length of Trail on Street (Feet): 1,425 Feet
- Length of Trail on Street (Miles): .27 Miles
- Removal of Traffic or Parking Lanes: None

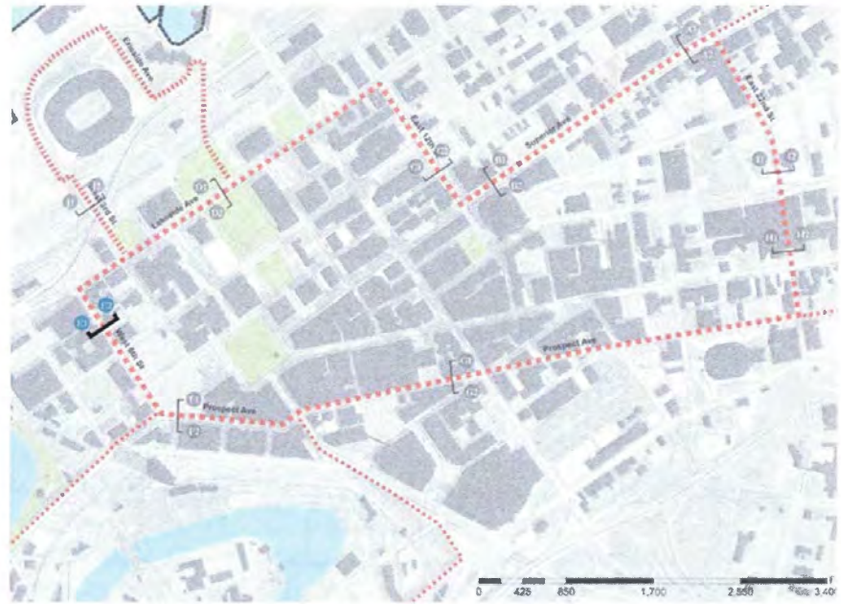


Figure 3.75: Downtown Framework Plan

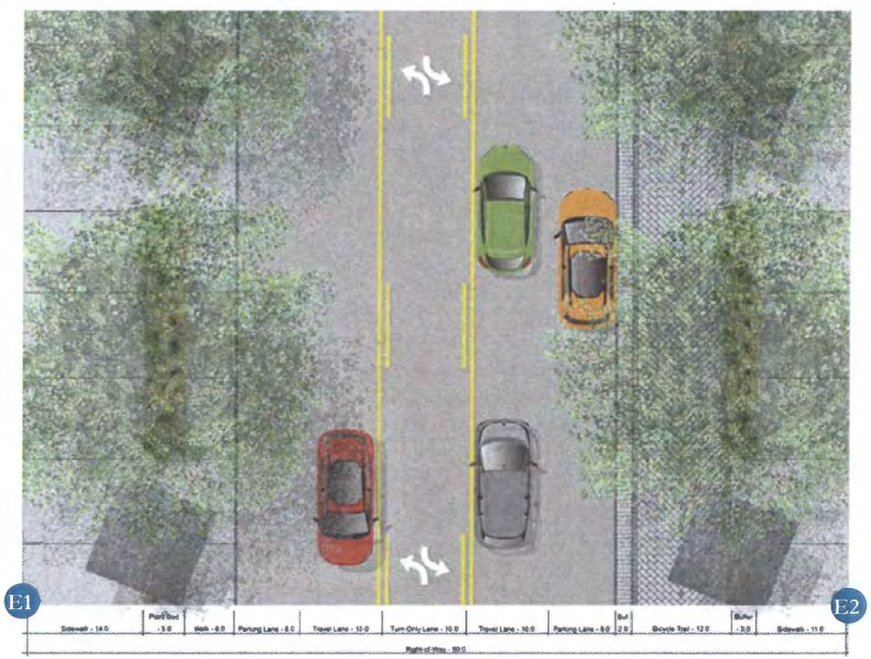


Figure 3.76: West 6th Street Between St. Clair Avenue and Johnson Court Zoomed-In Plan

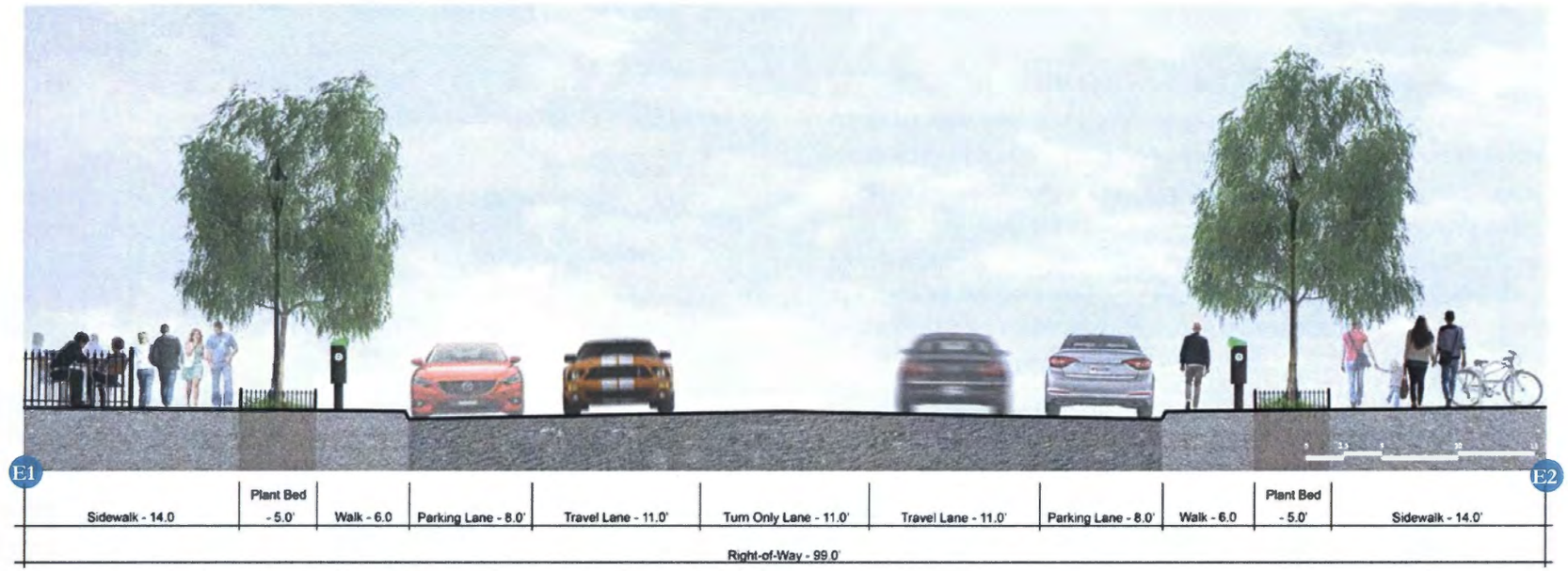


Figure 3.77: West 6th Street Between St. Clair Avenue and Johnson Court Existing Section

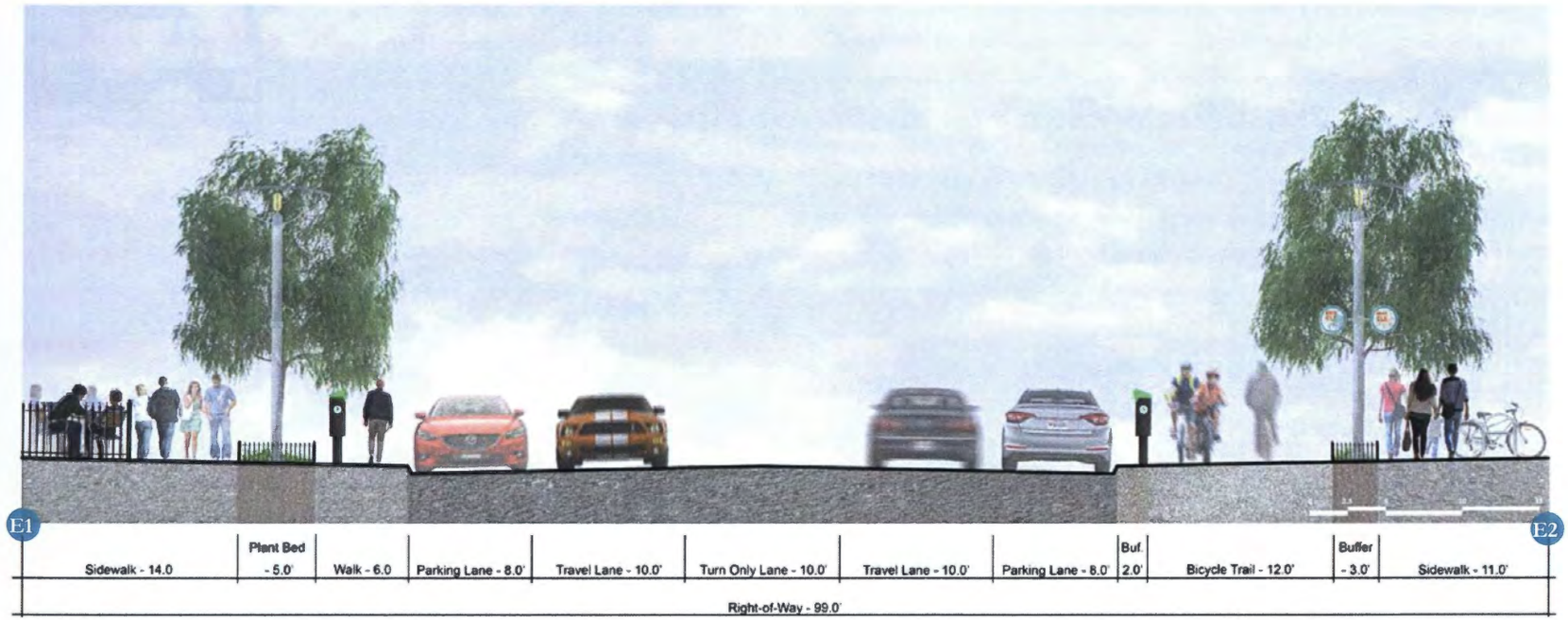


Figure 3.78: West 6th Street Between St. Clair Avenue and Johnson Court Proposed

Downtown Bicycle and Pedestrian Trail Loop Section- Prospect Ave Between West 3rd St and West 6th St

Existing Streetscape Condition

Prospect Avenue between West 3rd Street and West 6th Street has the potential for the inclusion of a separated bicycle and pedestrian trail loop system with several adjustments to the present infrastructure. This street contains a large right-of-way (98 feet) and has a high amount of traffic as it serves a popular bus route and layover station for the Cleveland RTA system. This street currently does not contain bicycle infrastructure and it lacks other desirable qualities such as street trees, planters, and buffers.

Proposed Changes

For the bicycle and pedestrian trail loop system to be inserted on Prospect Avenue between West 3rd Street and West 6th Street, several major modifications need to occur. Prior to these alterations, this portion of Prospect Avenue consisted of six lanes of traffic (four being travel lanes and two being bus layover lanes). To created spaces the eastern portion of the streetscape, the lane closest to the eastern curb is removed, establishing a five lane roadway. The two outside lanes are transferred once again to bus layover lanes while the center lane becomes a turn only lane. This allows enough space for the insertion the bicycle trail while also conforming this portion of Prospect Ave with the remainder of the street. Designed amenities are also added to this portion of the street in order to create a continuous aesthetic throughout the trail.

Statistics

- Right-of-Way Width (Feet): 98.00'
- Length of Trail on Street (Feet): 6,388 Feet
- Length of Trail on Street (Miles): 1.21 Miles
- Removal of Traffic or Parking Lanes: One Travel (Conversion of Other Lanes to Different Purposes)

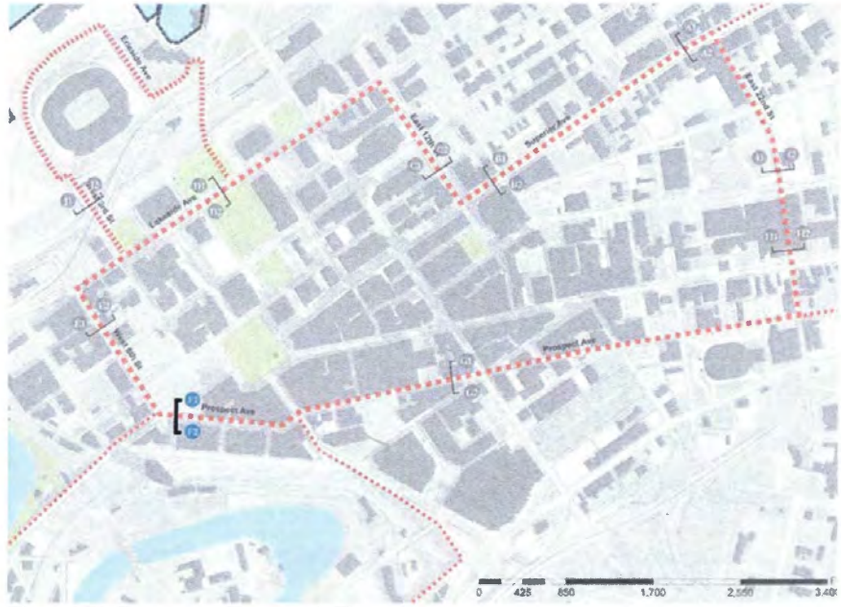


Figure 3.79: Downtown Framework Plan

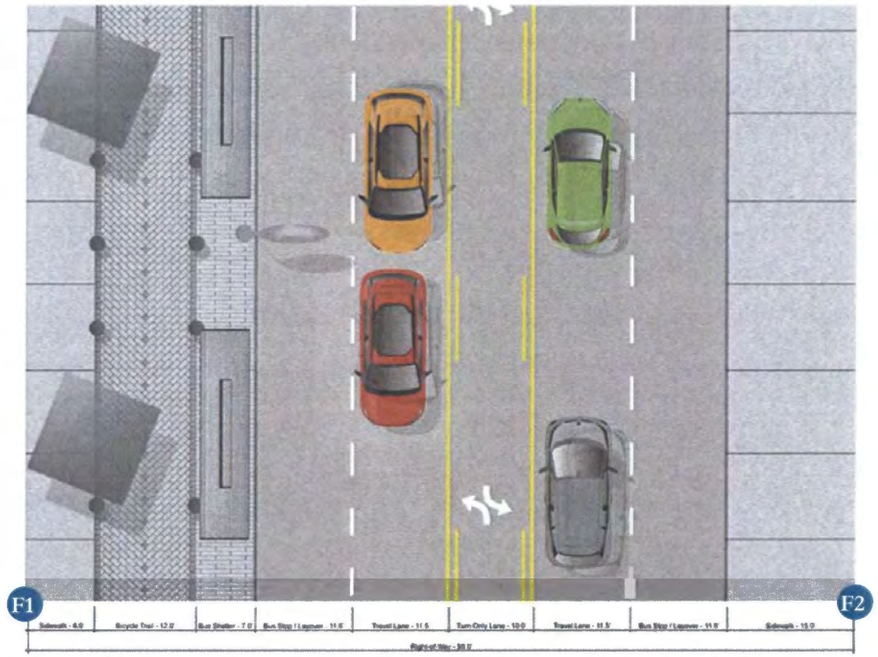


Figure 3.80: Prospect Avenue between West 3rd and 6th Street Zoomed-In Plan

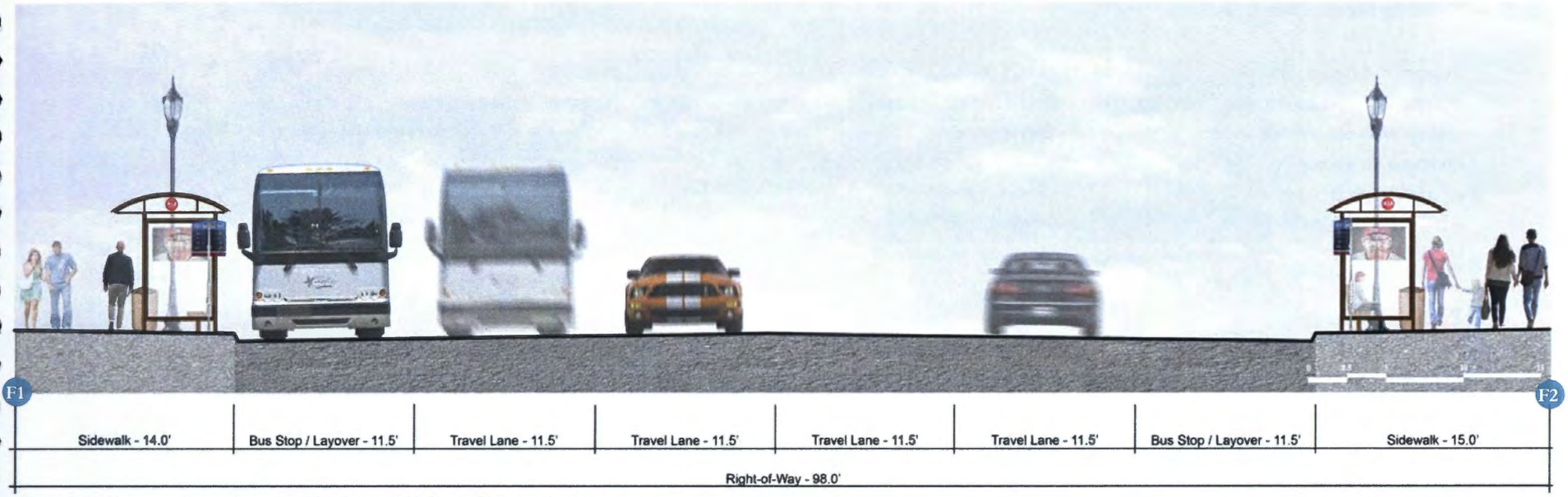


Figure 3.81: Prospect Avenue between West 3rd and 6th Street Existing Section

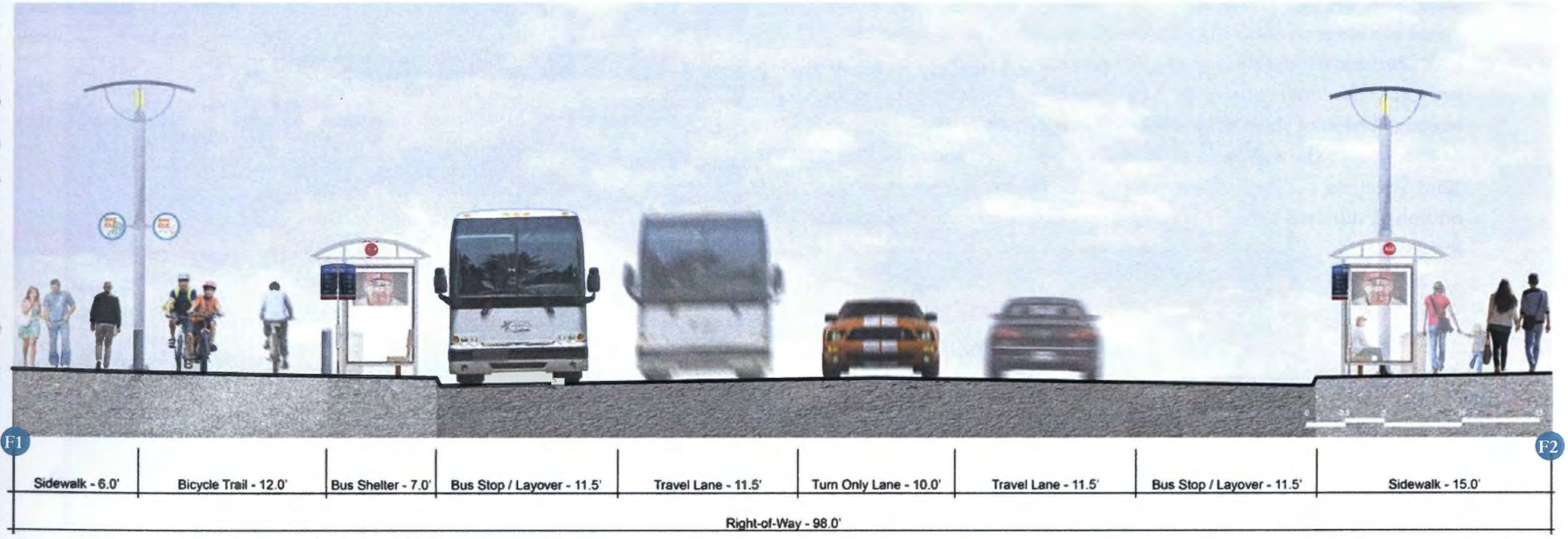


Figure 3.82: Prospect Avenue between West 3rd and 6th Street Proposed Section

Downtown Bicycle and Pedestrian Trail Loop Section- Prospect Ave Between East 8th St and Huron Rd

Existing Streetscape Condition

Prospect Avenue between East 8th Street and Huron Road has the potential for the inclusion of a separated bicycle and pedestrian trail loop system with several adjustments to the present infrastructure. This street contains an average urban right-of-way (80 feet) and has a high amount of traffic as it serves a popular bus and vehicular route. This street currently contains large 15 foot sidewalks, street trees, and bus stops.

Proposed Changes

For the bicycle and pedestrian trail loop system to be inserted on Prospect Avenue between East 8th Street and Huron Road, several major modifications need to occur. Since this portion of the roadway does not contain enough right-of-way space outside of the roadway, additional space needs to be made elsewhere. Unfortunately, a traditional road diet along does not provide enough extra space and the configuration and use of this street does not allow for the elimination of a parking or travel lane. Fortunately, this portion of the street has the ability to be shifted five feet to the south in order to create enough right-of-way space on the norther portion of the roadway. For this to successfully work, Prospect Avenue needs to be reconfigured west of Ontario Street and east of East 22nd Street via a slight jog. Designed amenities are also added to this portion of the street in order to create a continuous aesthetic throughout the trail.

Statistics

- Right-of-Way Width (Feet): 80.00'
- Length of Trail on Street (Feet): 6,388 Feet
- Length of Trail on Street (Miles): 1.21 Miles
- Removal of Traffic or Parking Lanes: None

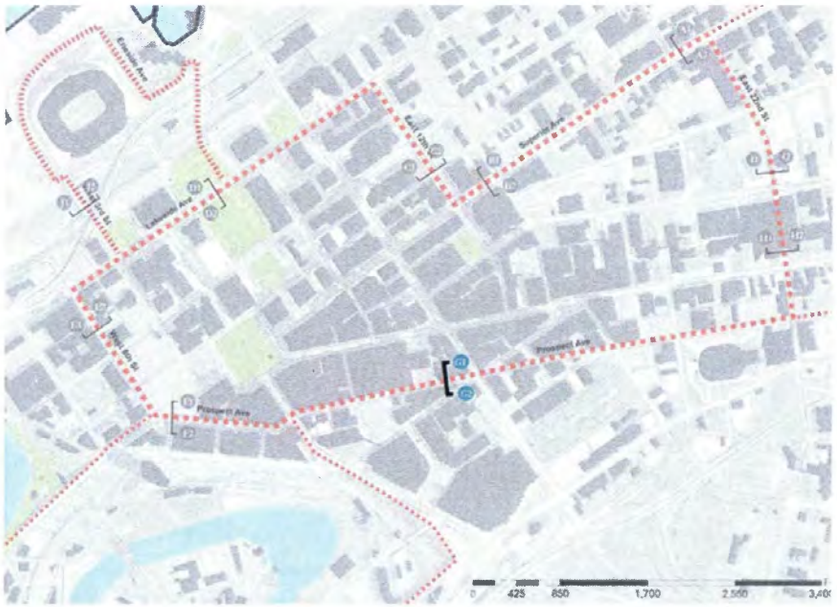


Figure 3.83: Downtown Framework Plan

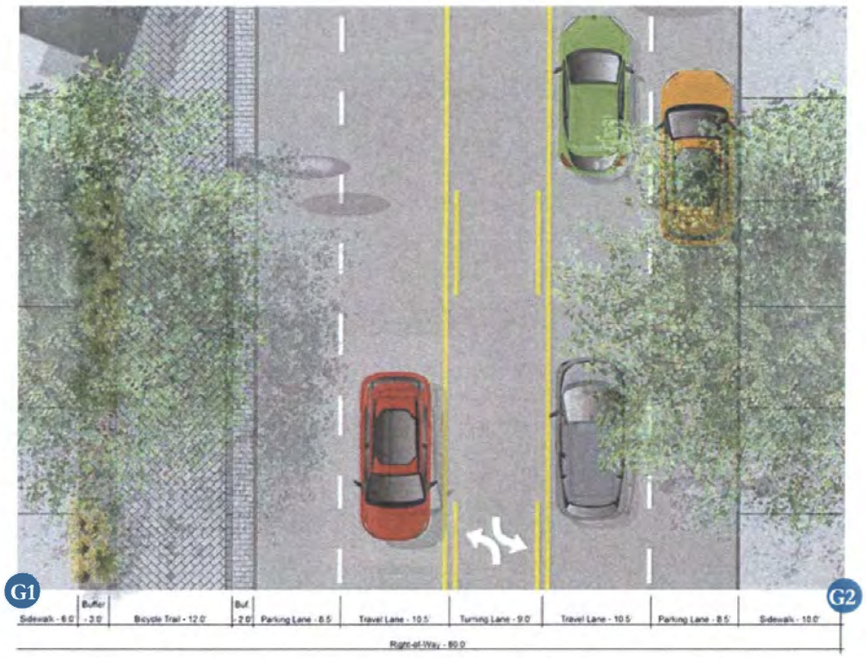


Figure 3.84: Prospect Avenue between East 8th St and Huron Rd Zoomed-In Plan

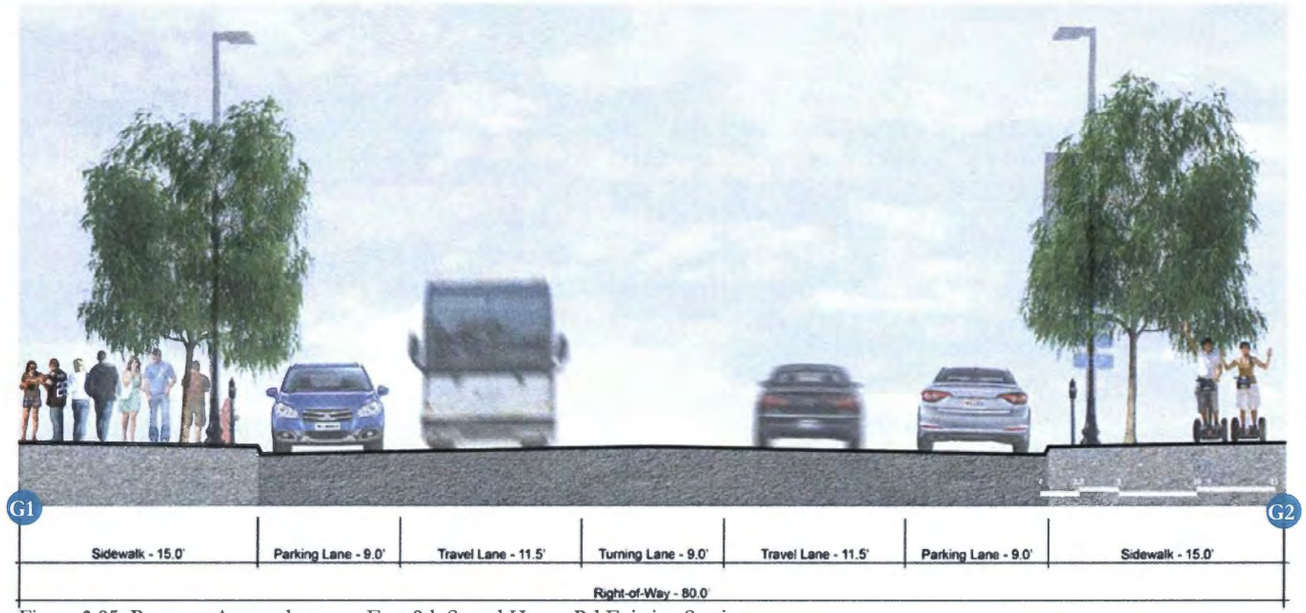


Figure 3.85: Prospect Avenue between East 8th St and Huron Rd Existing Section

Figure 3.86: Prospect Avenue between East 8th St and Huron Rd Proposed Section

Detailed Plan - East 22nd St

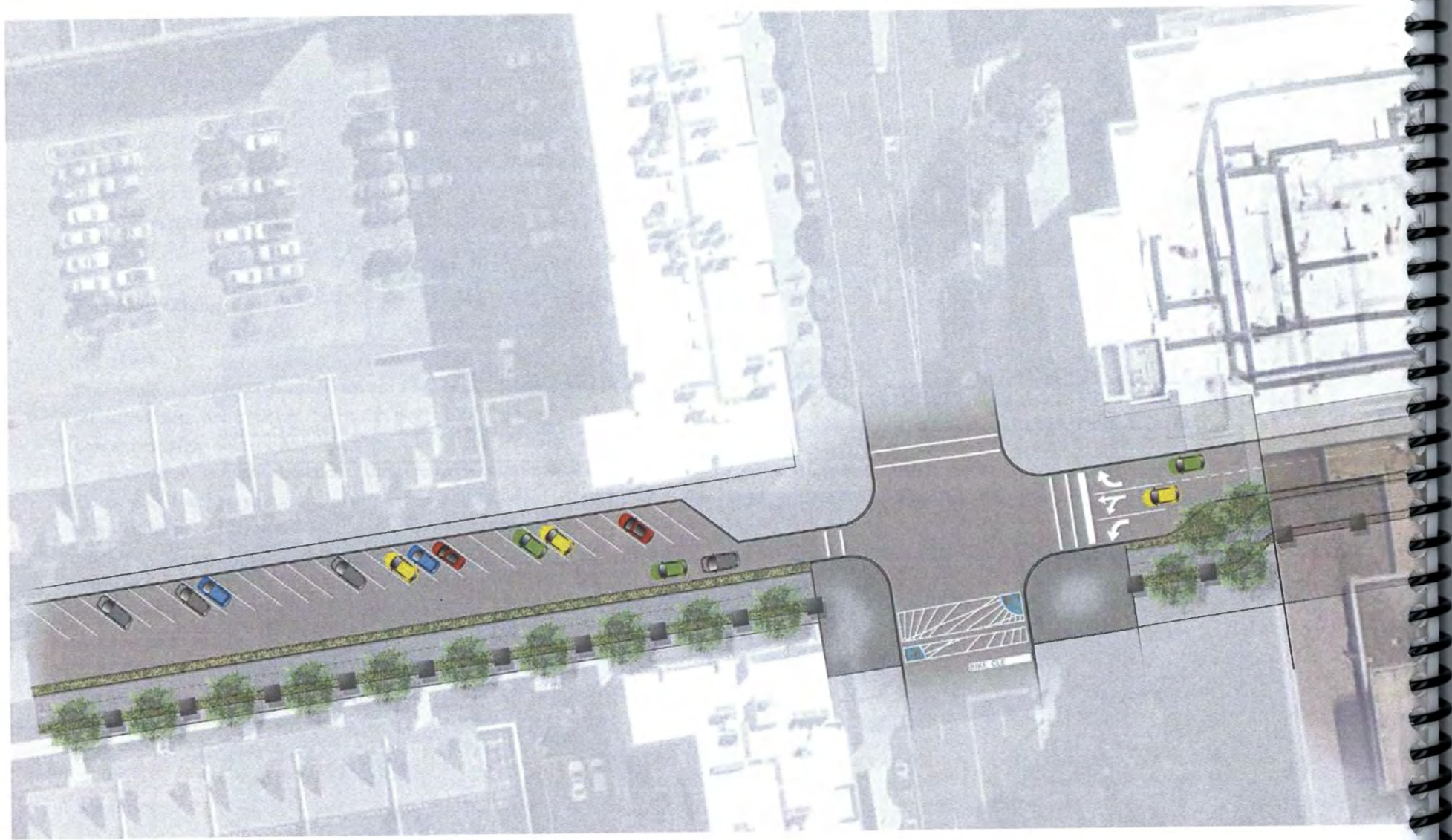
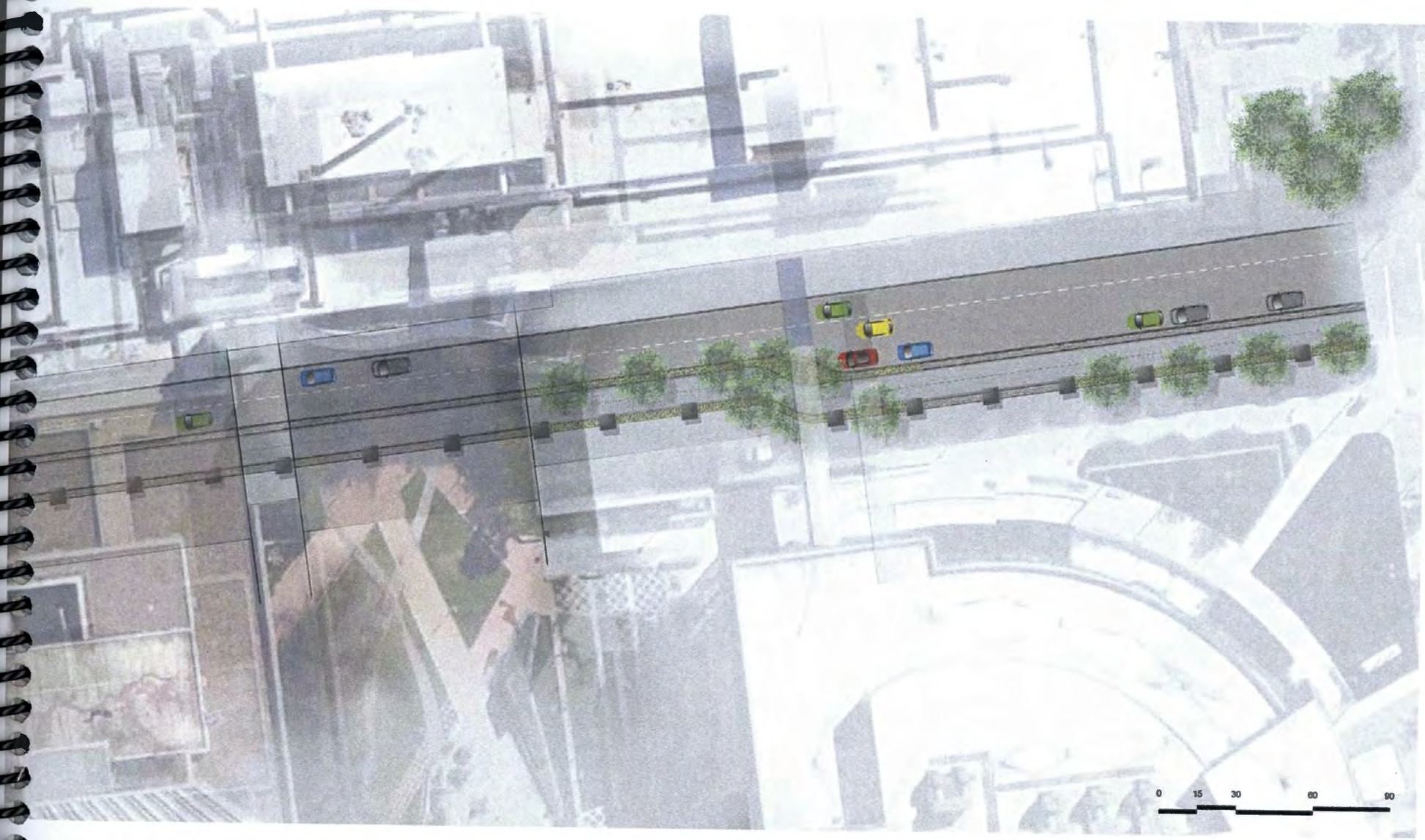


Figure 3.87: East 22nd Street Detailed Plan

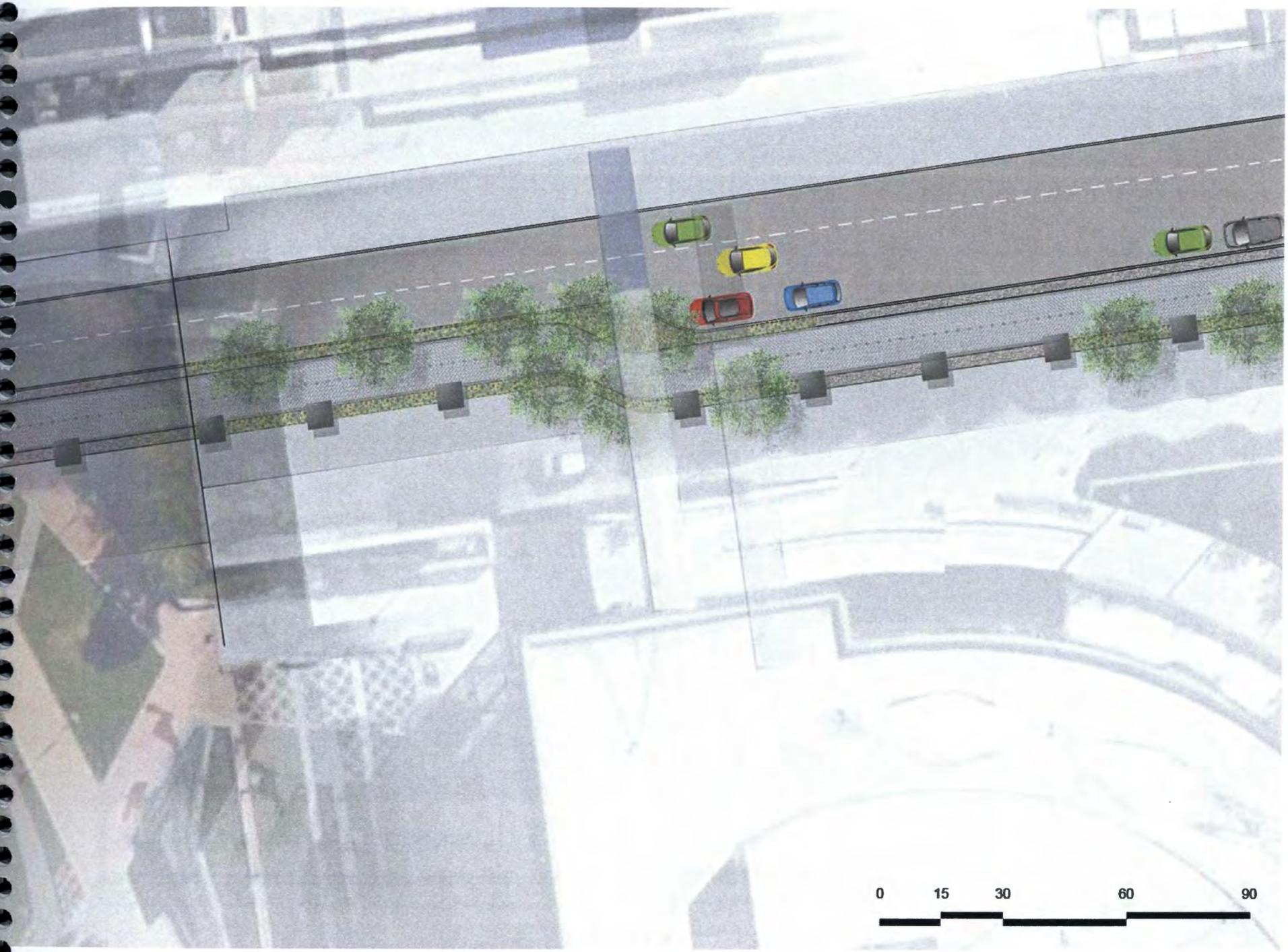
In order for East 22nd Street to allow for the insertion of the bicycle and pedestrian trail loop, several modifications need to occur. This street contains unique circumstance as multiple structures span over the street, limiting the available right-of-way for the inclusion of this trail. For this reason, this street is transformed from a four lane road (three travel and one parking) to a three land road (two travel and one parking) south of Chester



Avenue. As the structures span the road, the parking lane will give way to the trail, allowing the trail to pinch underneath the buildings. North of Chester Avenue, the parking will be reconfigured from two parallel lanes to one angled lane in order to make room on the western side for the bicycle trail.

Detailed Plan - East 22nd St (Focus from Euclid Ave to Chester Ave)

Figure 3.88: East 22nd Detailed Plan between Euclid Avenue and Chester Avenue


0
15
30
60
90

Downtown Bicycle and Pedestrian Trail Loop Section- East 22nd St Between Euclid Ave and Chester Ave

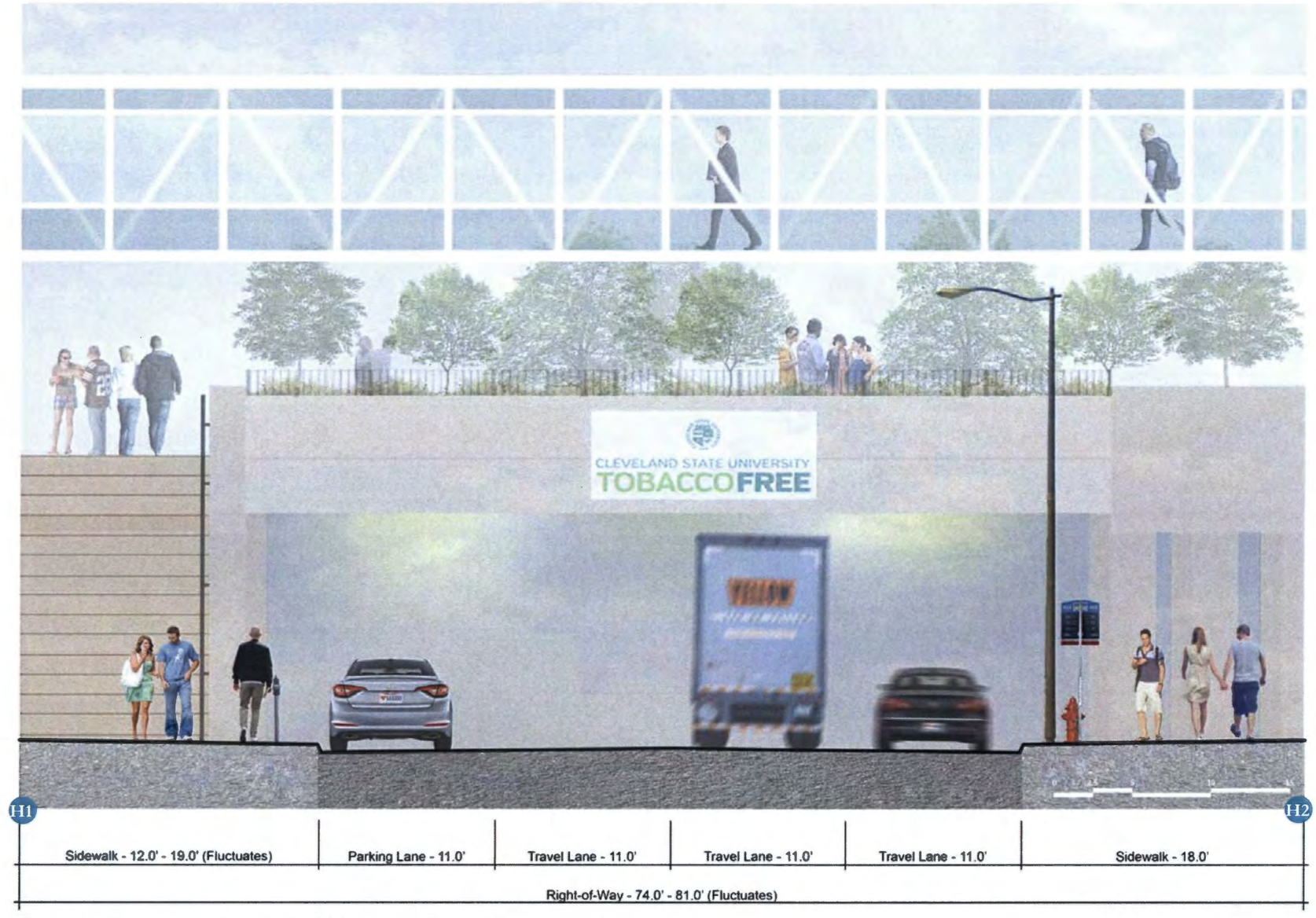


Figure 3.89: East 22nd Street between Euclid Avenue and Chester Avenue Existing Section

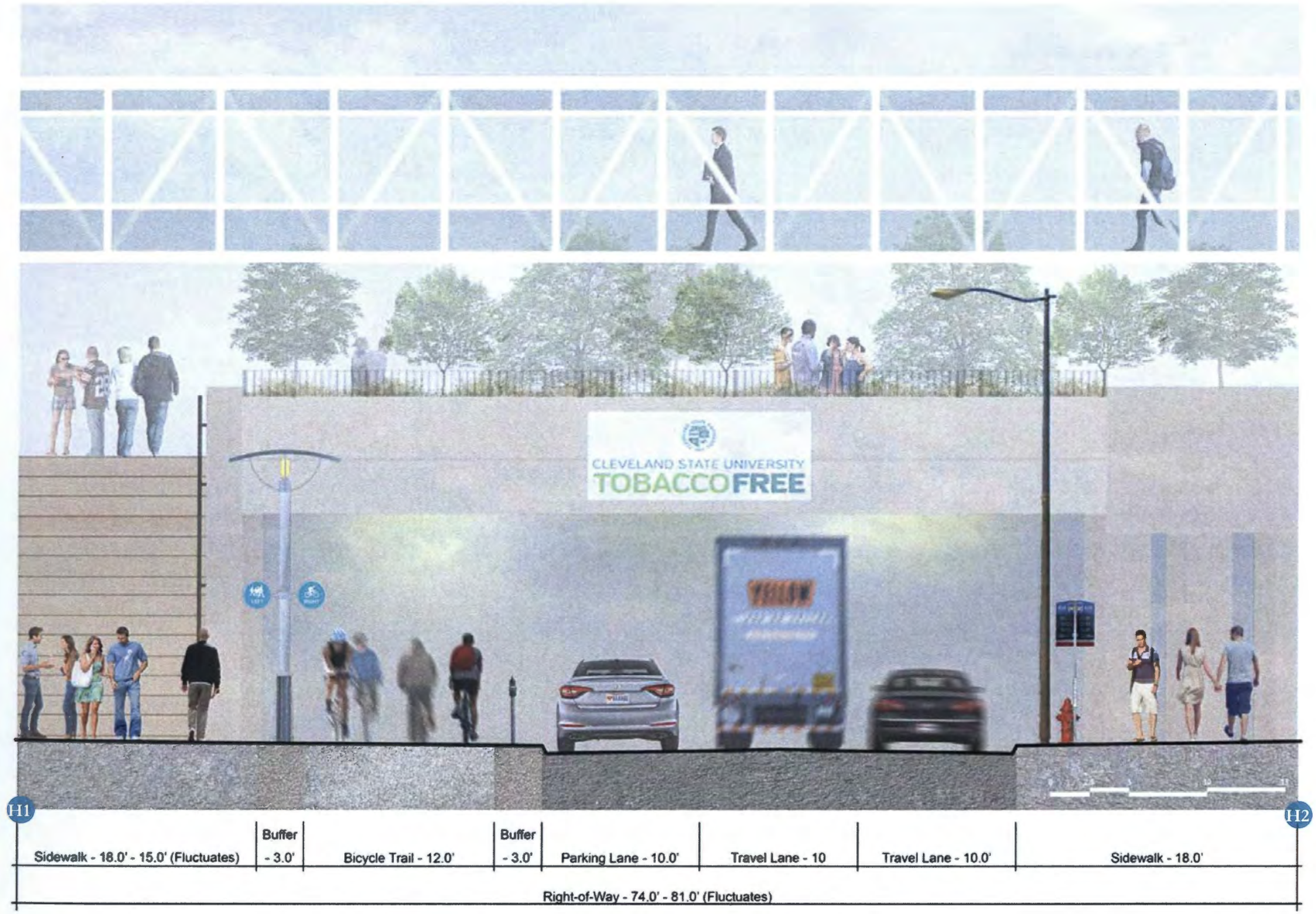
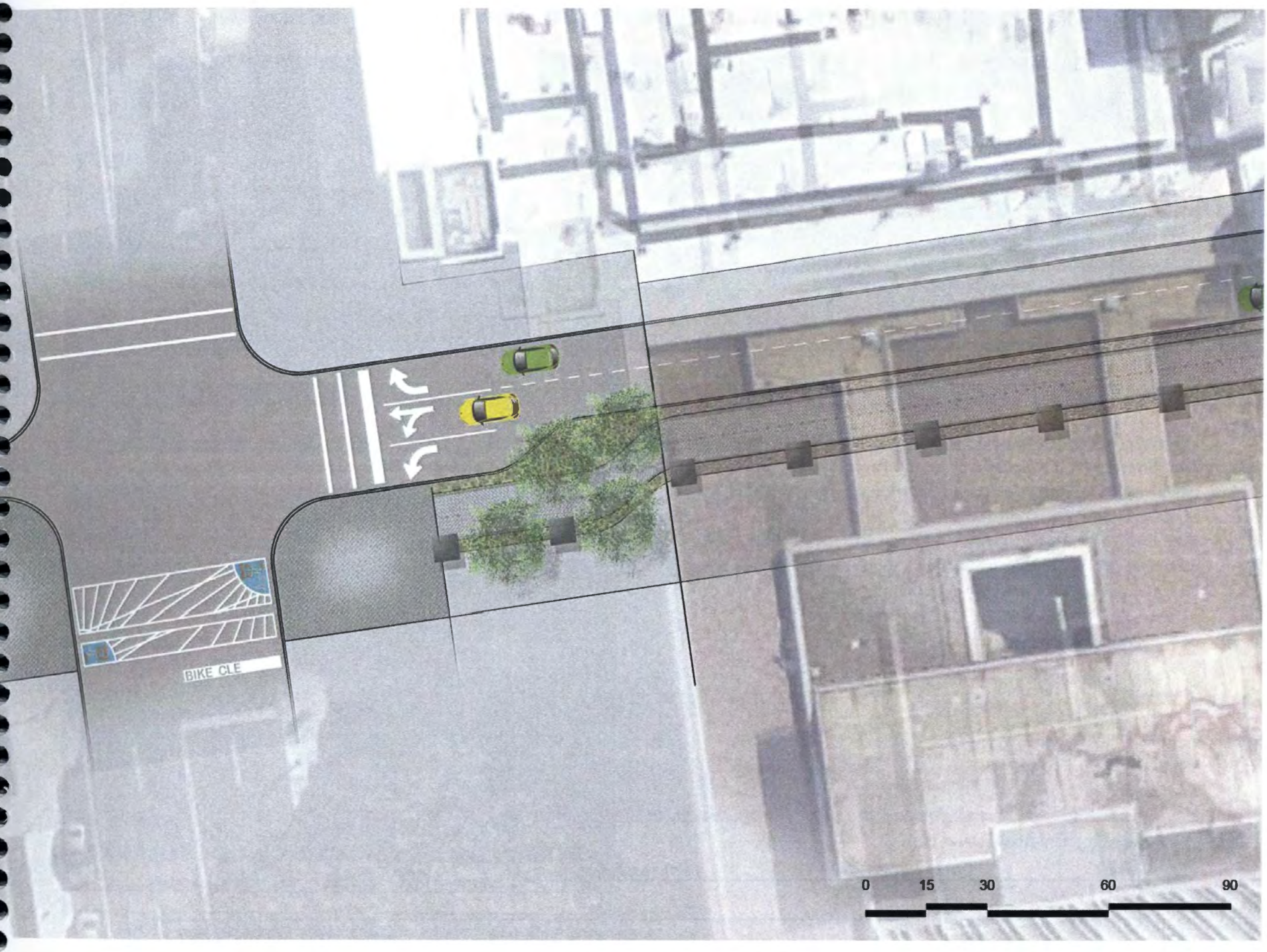


Figure 3.90: East 22nd Street between Euclid Avenue and Chester Avenue Proposed Section

Detailed Plan - East 22nd St (Focus on East 22nd St and Chester Ave Intersection)

Figure 3.91: East 22nd Street Detailed Plan near East 22nd St and Chester Ave Intersection


BIKE CLE
0
15
30
60
90

Downtown Bicycle and Pedestrian Trail Loop Section- East 22nd St Between Chester Ave and Payne Ave

Existing Streetscape Condition

East 22nd Street between Chester Avenue and Payne Avenue has the potential for the inclusion of a separated bicycle and pedestrian trail loop system with major adjustments to the present infrastructure. This street is solely located in the Campus District and serves as a major one-way (north running) vehicular route for the Cleveland State Community. This street has a small urban right-of-way (60 feet) and primarily serves and on campus residential community. This section of the street contains two lanes of parallel parking, sidewalks, and young street trees. In many locations, the sidewalk in crumbling and needs to be replaced.

Proposed Changes

For the bicycle and pedestrian trail loop system to be inserted on East 22nd Street between Chester Avenue and Payne Avenue, several major modifications need to occur. To created acceptable space for the insertion of the trail on the west side of the street parking will be reconfigured from two parallel lanes to one angled lane. This allows the amount of parking to remain constant, while opening up the west side of the street. Designed amenities are also added to this portion of the street in order to create a continuous aesthetic throughout the trail.

Statistics

- Right-of-Way Width (Feet): 60.00'
- Length of Trail on Street (Feet): 2,904 Feet
- Length of Trail on Street (Miles): .55 Miles
- Removal of Traffic or Parking Lanes: One Parking (Changed Other Parking Strucutre from Parallel to Angled)

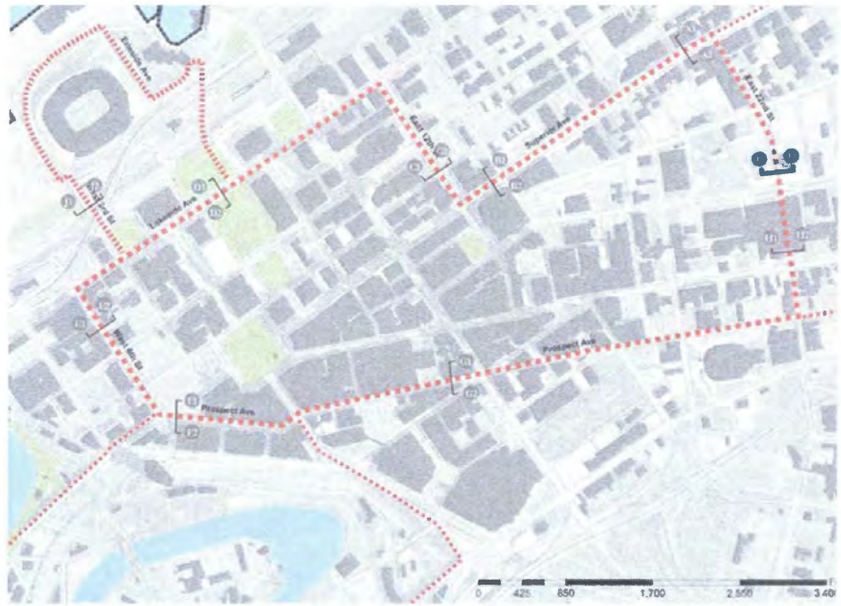


Figure 3.92: Downtown Framework Plan

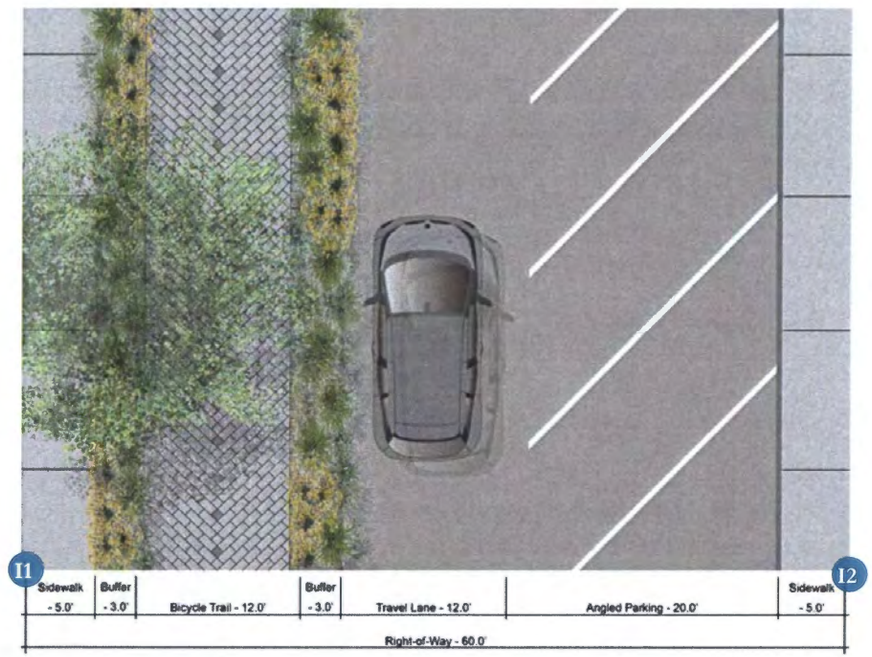


Figure 3.93: East 22nd Street between Chester Ave and Payne Ave Zoomed-In Plan

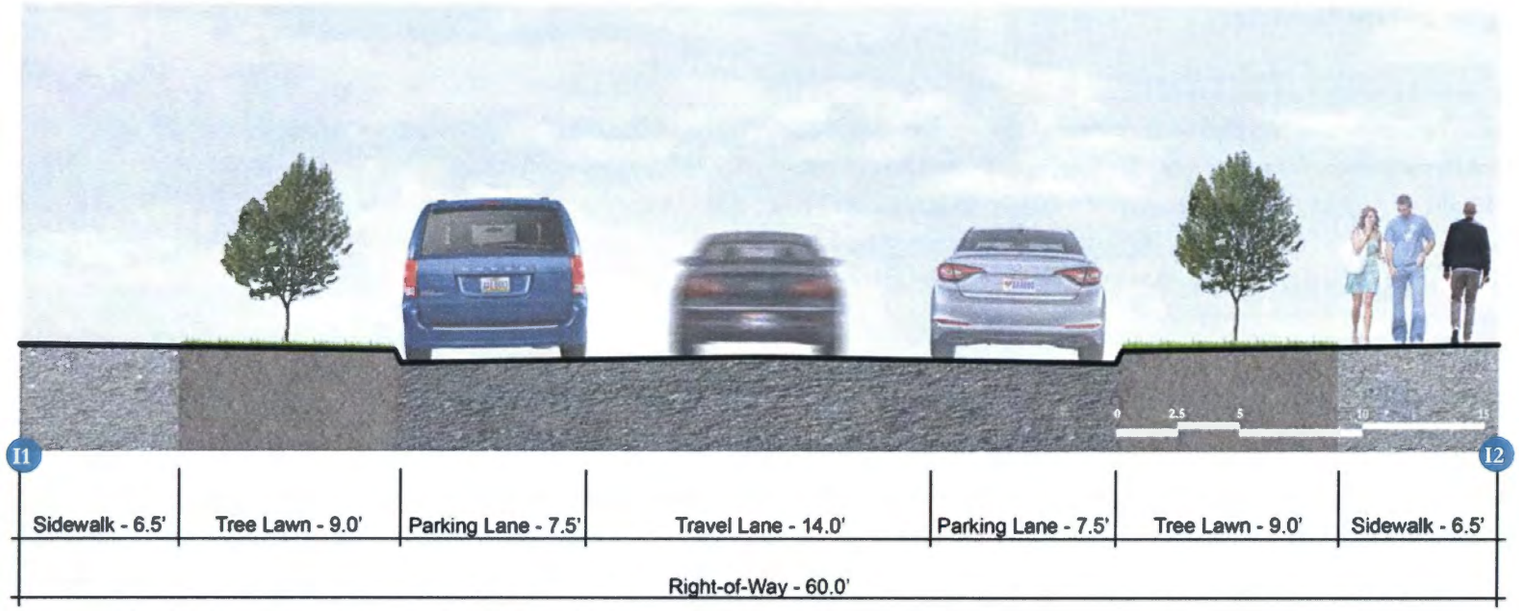


Figure 3.94: East 22nd Street between Chester Ave and Payne Ave Existing Section

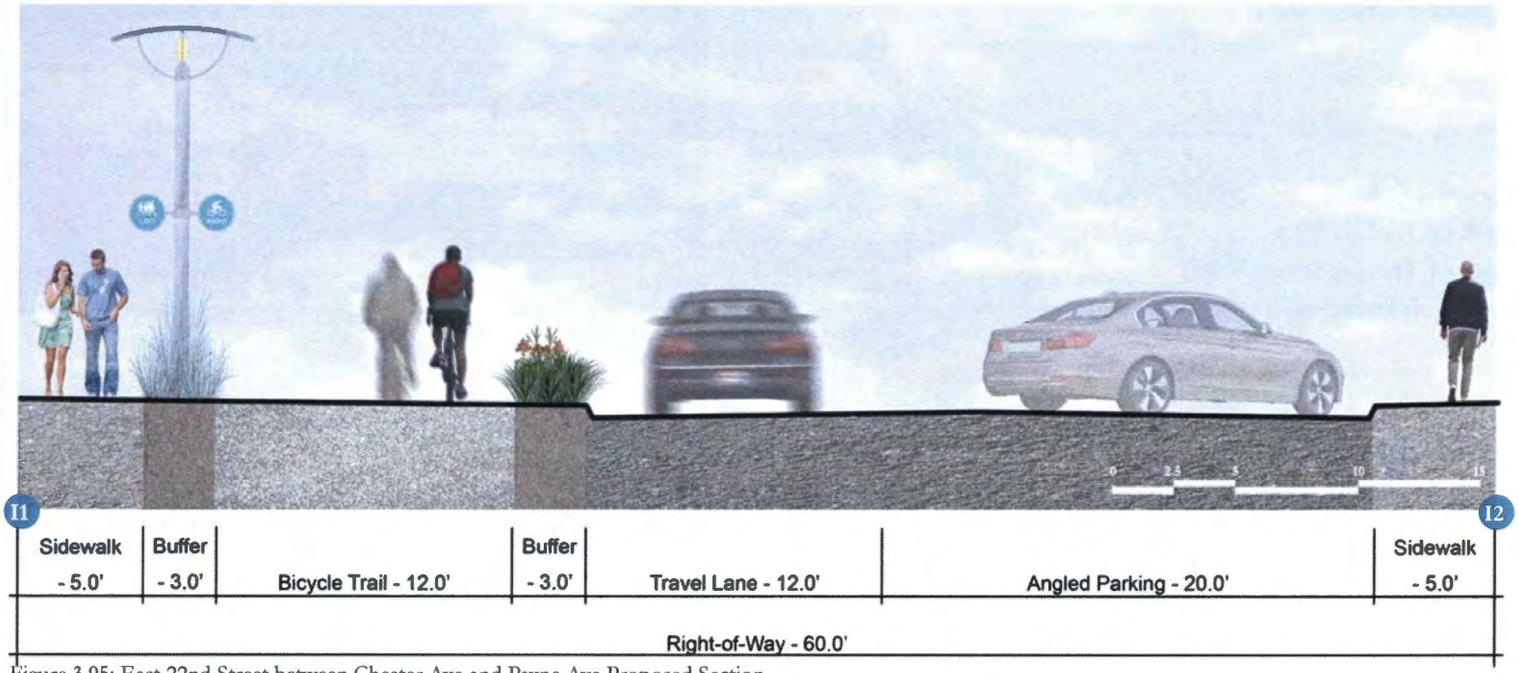


Figure 3.95: East 22nd Street between Chester Ave and Payne Ave Proposed Section

Downtown Bicycle and Pedestrian Trail Loop Section- West 3rd St Between Summit and Al Lerner Way

Existing Streetscape Condition

West 3rd Street between Summit and Al Lerner Way has the potential for the inclusion of a separated bicycle and pedestrian trail loop with minimal adjustment to the present infrastructure. This street in a secondary street and has a right-of-way of 69 feet. This street is highly underutilized by pedestrians as it connects to few day-to-day amenity needs; however, this street is one of the few areas in which downtown residents can reach the waterfront.

Proposed Changes

As West 3rd Street between Summit and Al Lerner Way contains enough available right-of-way space without altering the street, the inclusion of the bicycle and pedestrian trail loop on this portion of the corridor no road modification. Designed amenities are added to this portion of the street in order to create a continuous aesthetic throughout the trail.

Statistics

- Right-of-Way Width (Feet): 69.00'
- Length of Trail on Street (Feet):
- Length of Trail on Street (Miles):
- Removal of Traffic or Parking Lanes: None

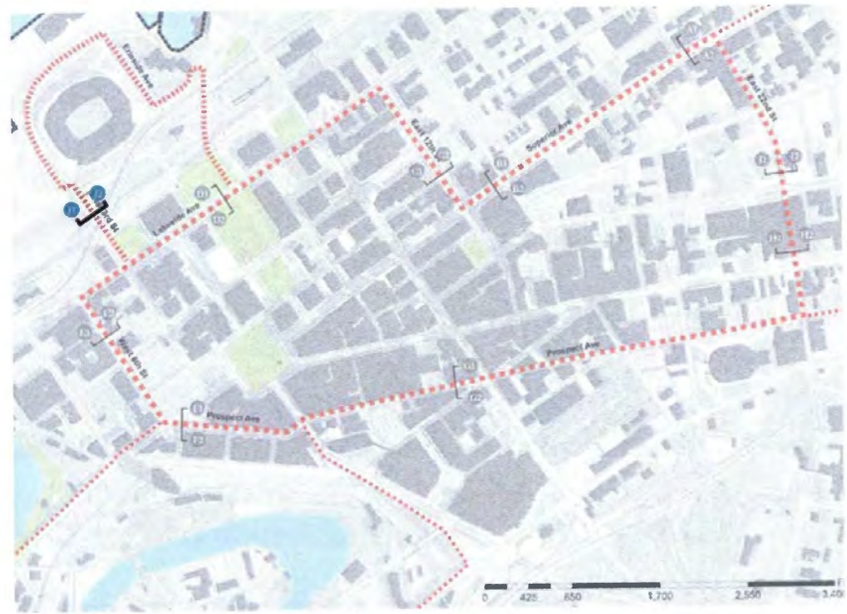


Figure 3.96: Downtown Framework Plan

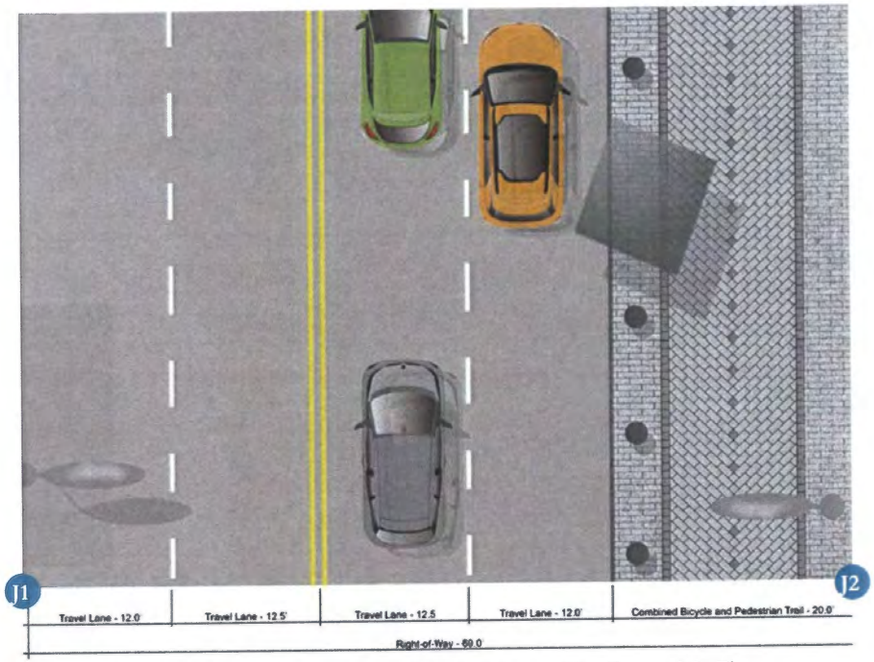


Figure 3.97: West 3rd Street between Summit and Al Lerner Way Zoomed-In Plan

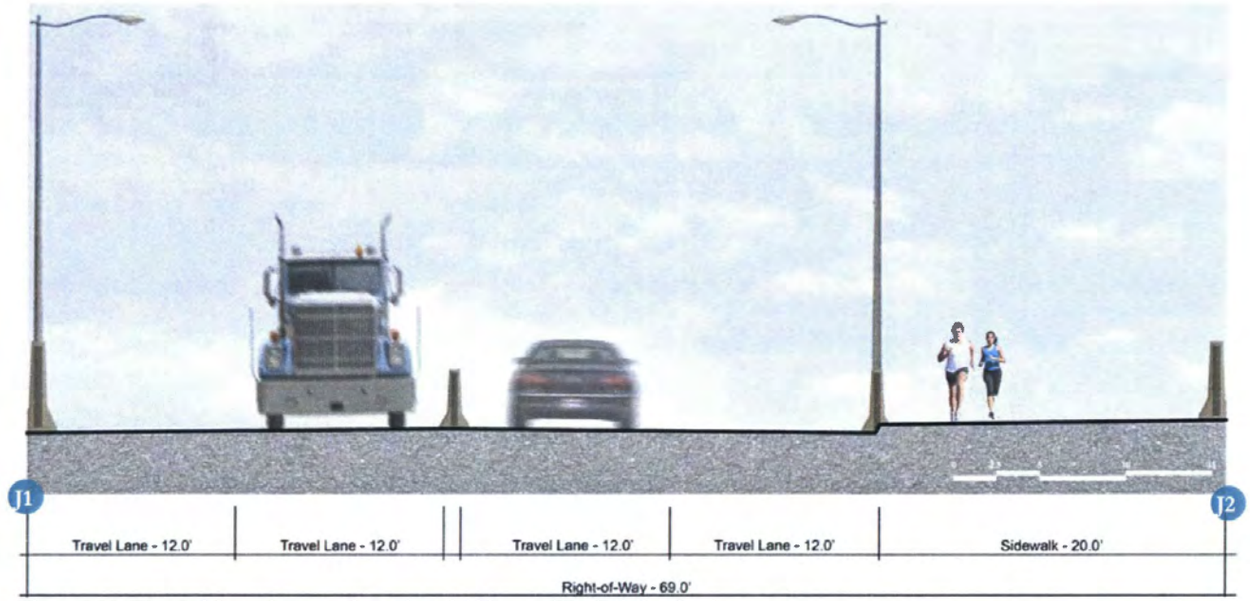


Figure 3.98: West 3rd Street between Summit and Al Lerner Way Existing Section

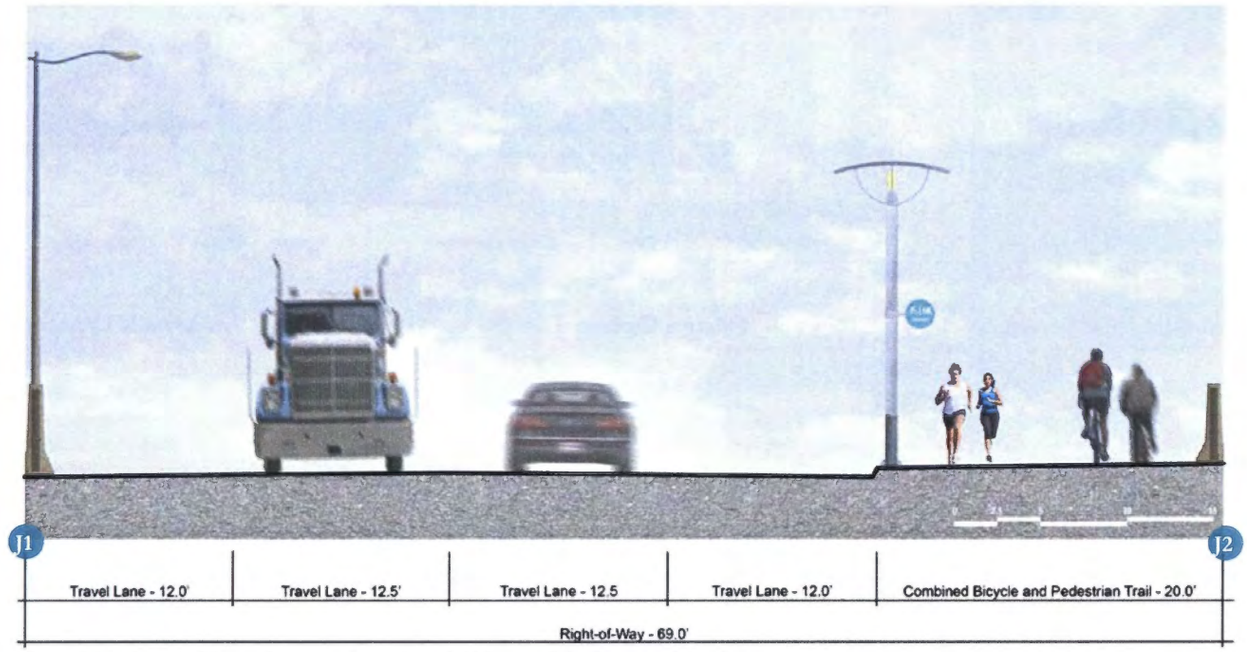


Figure 3.99: West 3rd Street between Summit and Al Lerner Way Proposed Section

Crosswalk Design

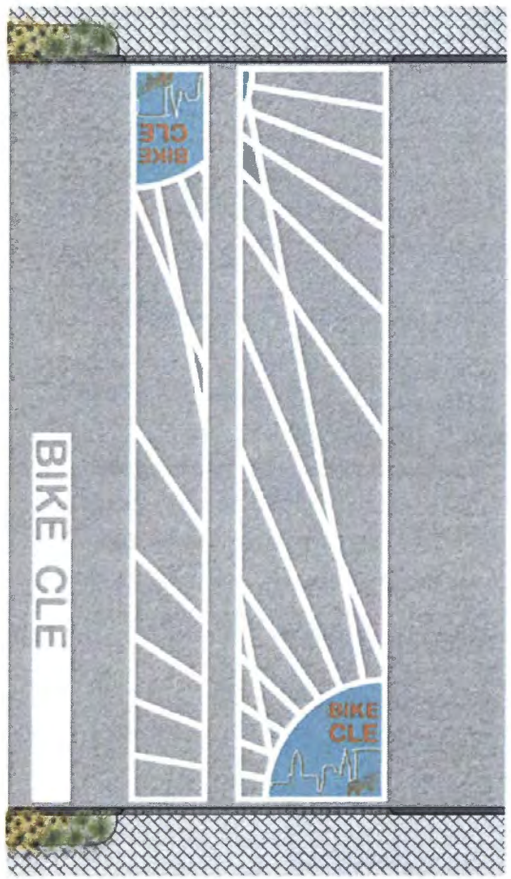


Figure 3.100
Crosswalk Design Option One - Preferred

Figure 3.101
Crosswalk Design Option Two

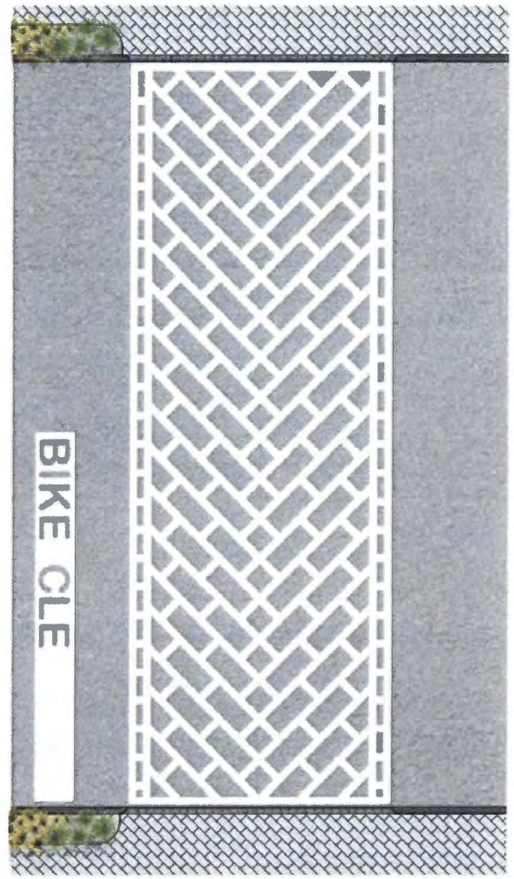


Figure 3.102
Crosswalk Design Option 3

Pavement Design

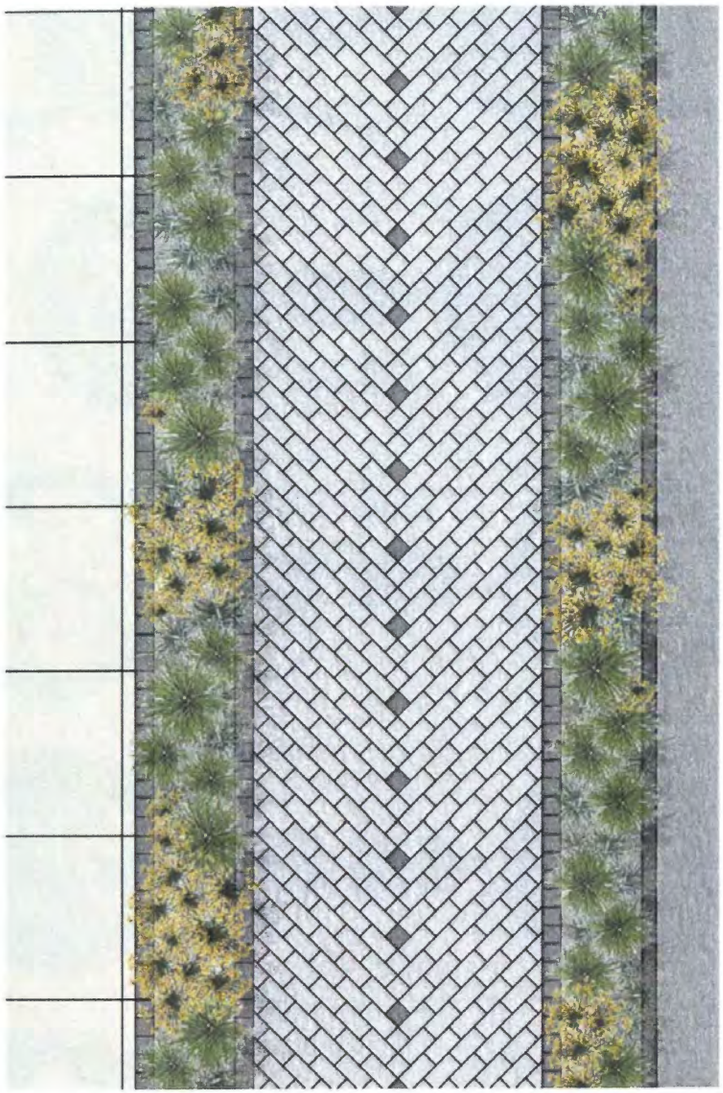


Figure 3.103

Paving Design - Standard Pattern
This is the typical paving pattern for the bicycle and pedestrian trail loop system.

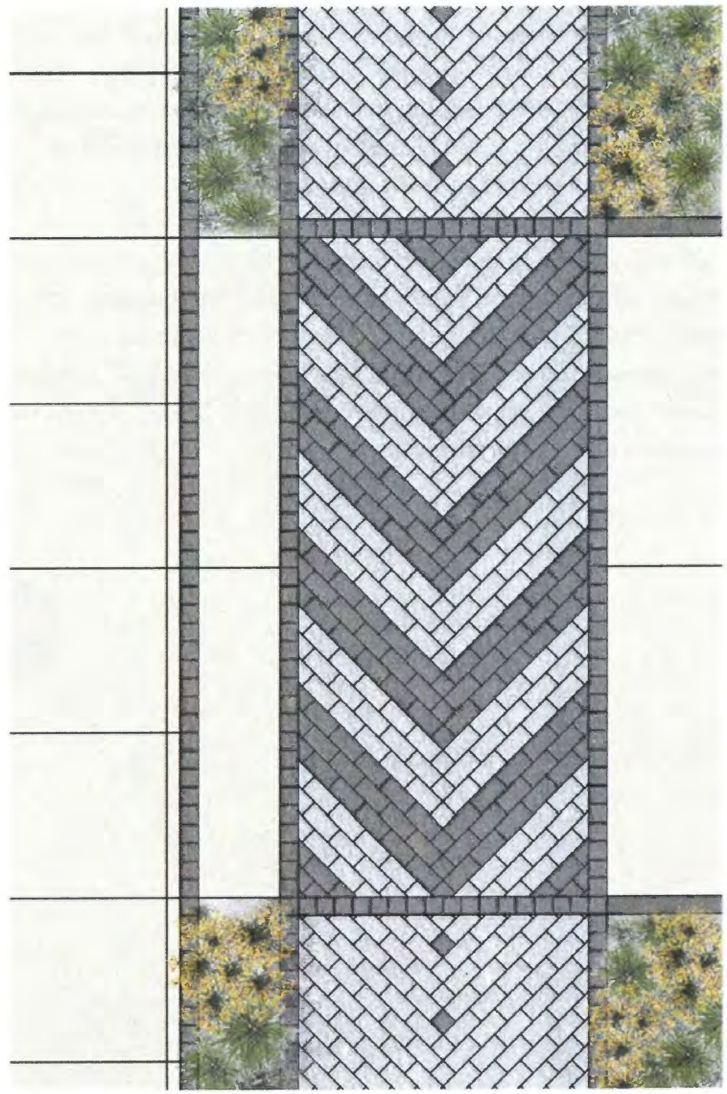


Figure 3.104

Paving Design - Zone of Conflict Pattern
This paving pattern will be utilized when the trail crosses drives, parking lots, etc...

Trail Signage

This project develops a clear design language aimed at guiding users through the experience of the bicycle and pedestrian trail loop system. Regulatory and warning signs are backed on an aqua blue plate and contain a variety of symbols, words or short phrases in indicated any upcoming changes from the present trail system. Additional signs may be added in the same design aesthetic when needed.

In addition to creating regulatory signs for this trial system, this project aimed to create signage that can be utilized for branding and trail identification. These BIKE CLE signs depict either a cyclists or an abstracted background of the city in aqua blue and orange. This confirms to visitors that they are in fact utilizing the bicycle and pedestrian trail loop and further unifies the system as a whole.

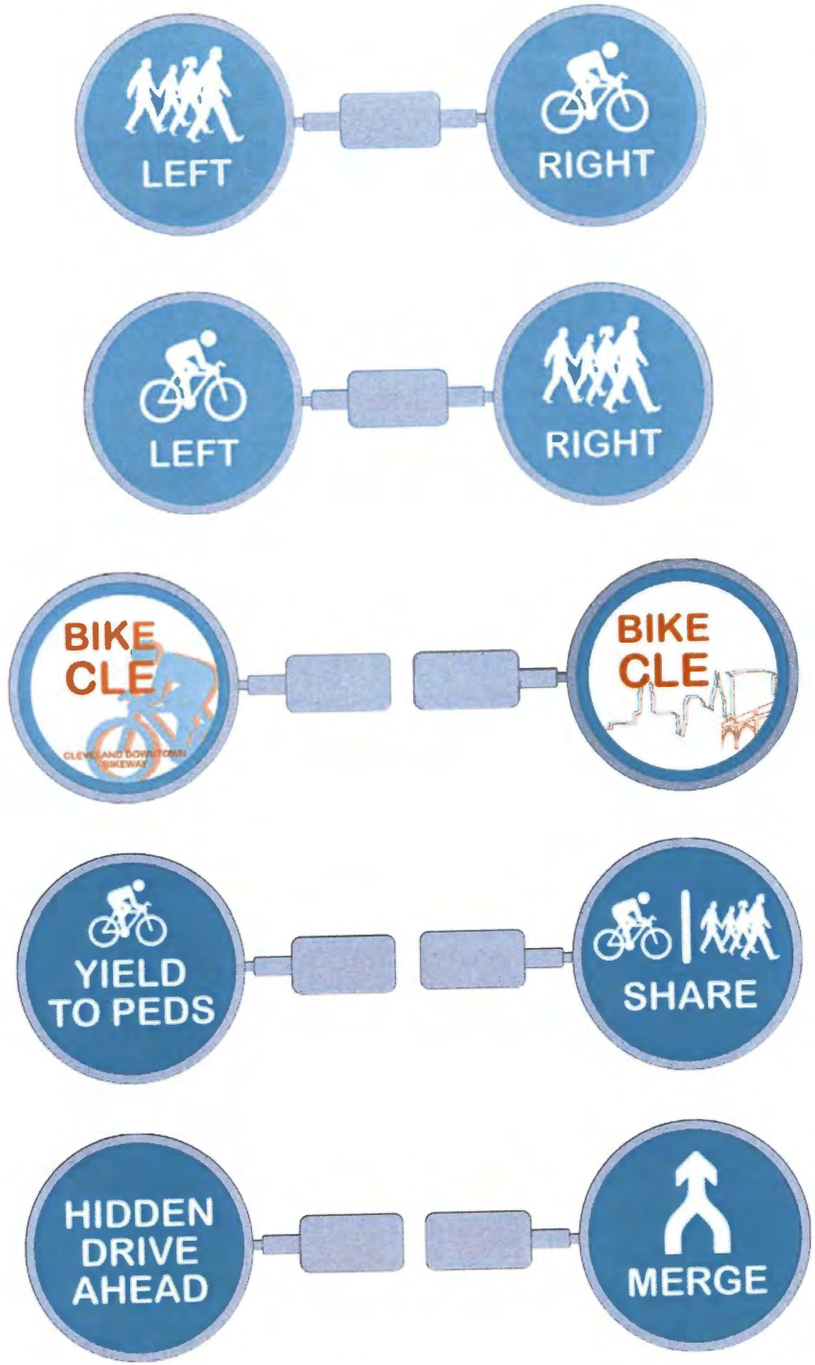


Figure 3.105: Trail Signage and Branding

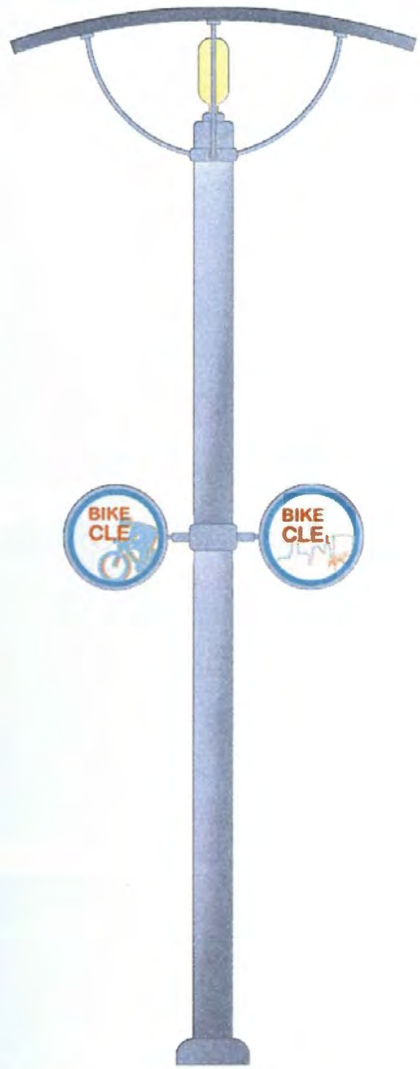


Figure 3.106:
Lighting Design - Double Sign

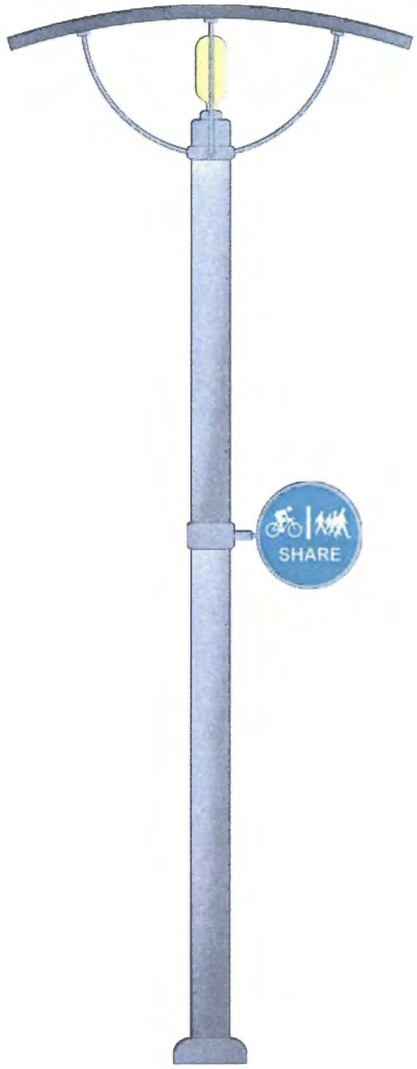


Figure 3.107:
Lighting Design - Single Sign

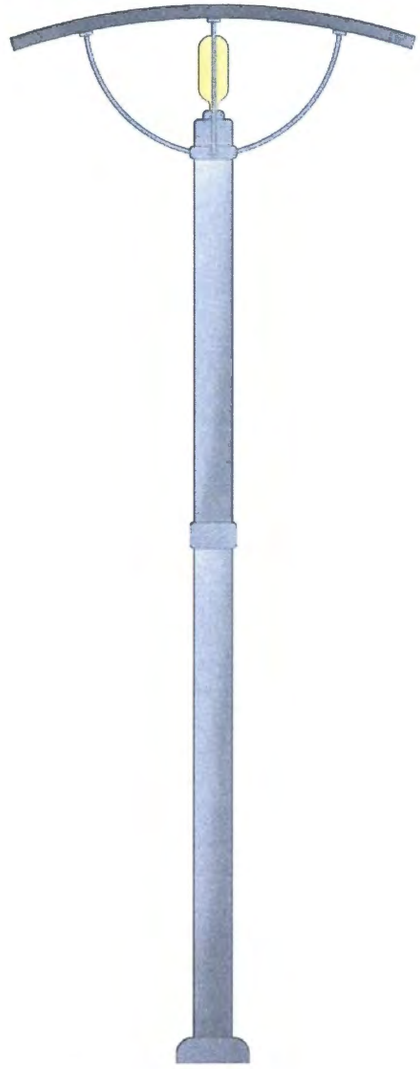


Figure 3.108:
Lighting Design - No Sign

Plant Recommendations

The following plants serve as a recommendation for use along the proposed bicycle and pedestrian trail loop. These species would be utilized in the buffers and along the trail edge where necessary.

Trees:
Honey Locust – *Gleditsia triacanthos var. inermis*
Japanese Zelkova – *Zelkova serrata*
Red Maple – *Acer rubrum*

Shrubs:
Arrowwood Viburnum – *Viburnum dentatum*
Boxwood – *Buxus (Several Varieties)*
Neon Flash Spirea – *Spiraea 'Neon Flash'*
Japanese Barberry - *Berberis thunbergii*
Chinese Juniper – *Juniperus chinensis*

Grasses:
Autumn Moor Grass - *Seslaria autumnalis*
Fountain Grass - *Pennisetum alopecuroides*
Korean Feather Reed Grass - *Calamagrostis arund. 'Brachytricha'*
Little Bluestem - *Schizachyrium scoparium*
Switch Grass – *Panicum virgatum*

Perennials / Groundcovers:
Black-Eye Susan – *Rudbeckia fulgida*
Blue Cloud Calamint - *Calamintha nepeta 'Blue Cloud'*
Coneflower – *Echinachea (Several Varieties)*
Cranesbill – *Geranium (Several Varieties)*
Daylily – *Hermerocallis (Several Varieties)*
Honeysong Purple Stokes Aster - *Stokesia laevis 'Honeysong Purple'*
Lilac - *Syringa meyeri 'Palibin'*
Lily Turf – *Liriope muscari*
Miniature Stonecrop - *Sedum requieni*
Salvia – *Salvia nemorosa*
Walker's Low Catmint - *Nepeta x faassenii 'Walker's Low'*


Figure 3.109: Honey Locust


Figure 3.110: Japanese Zelkova


Figure 3.111: Red Maple


Figure 3.112: Arrowwood Viburnum


Figure 3.113: Boxwood


Figure 3.114: Chinese Juniper


Figure 3.115: Japanese Barberry


Figure 3.116: Neon Flash Spirea

Figure 3.117: Autumn Moor Grass

Figure 3.121: Switch Grass

Figure 3.125: Cranesbill

Figure 3.129: Lily Turf

Figure 3.118: Fountain Grass

Figure 3.122: Black-Eye Susan

Figure 3.126: Daylily

Figure 3.130: Miniature Stonecrop

Figure 3.119: Korean Feather Reed Grass

Figure 3.123: Blue Cloud Calamin

Figure 3.127: Honeysong Purple Stokes Aster

Figure 3.131: Salvia

Figure 3.120: Little Bluestem

Figure 3.124: Coneflower

Figure 3.128: Lilac

Figure 3.132: Walker's Low Catmint

Full City Bicycle Framework Plan

The Full City Bicycle Framework Plan aims to expand upon the downtown bicycle and pedestrian trail loop system by extending into neighboring communities. This allows for a wider connectivity in the Cleveland bicycle network system and allows more individuals to access this new amenity.

While the downtown bicycle and pedestrian trail loop system solely utilized the separated trail-use typology and the combined trail-use typology, these suggestive routes utilize the bike lane typology and the sharrow typology as well. This allows a greater number of people to be reached without drastically altering roadways that extend into neighborhoods on the city's outskirts. This helps to minimize cost for these suggestive routes and allows this infrastructure to further develop over the coming decade.

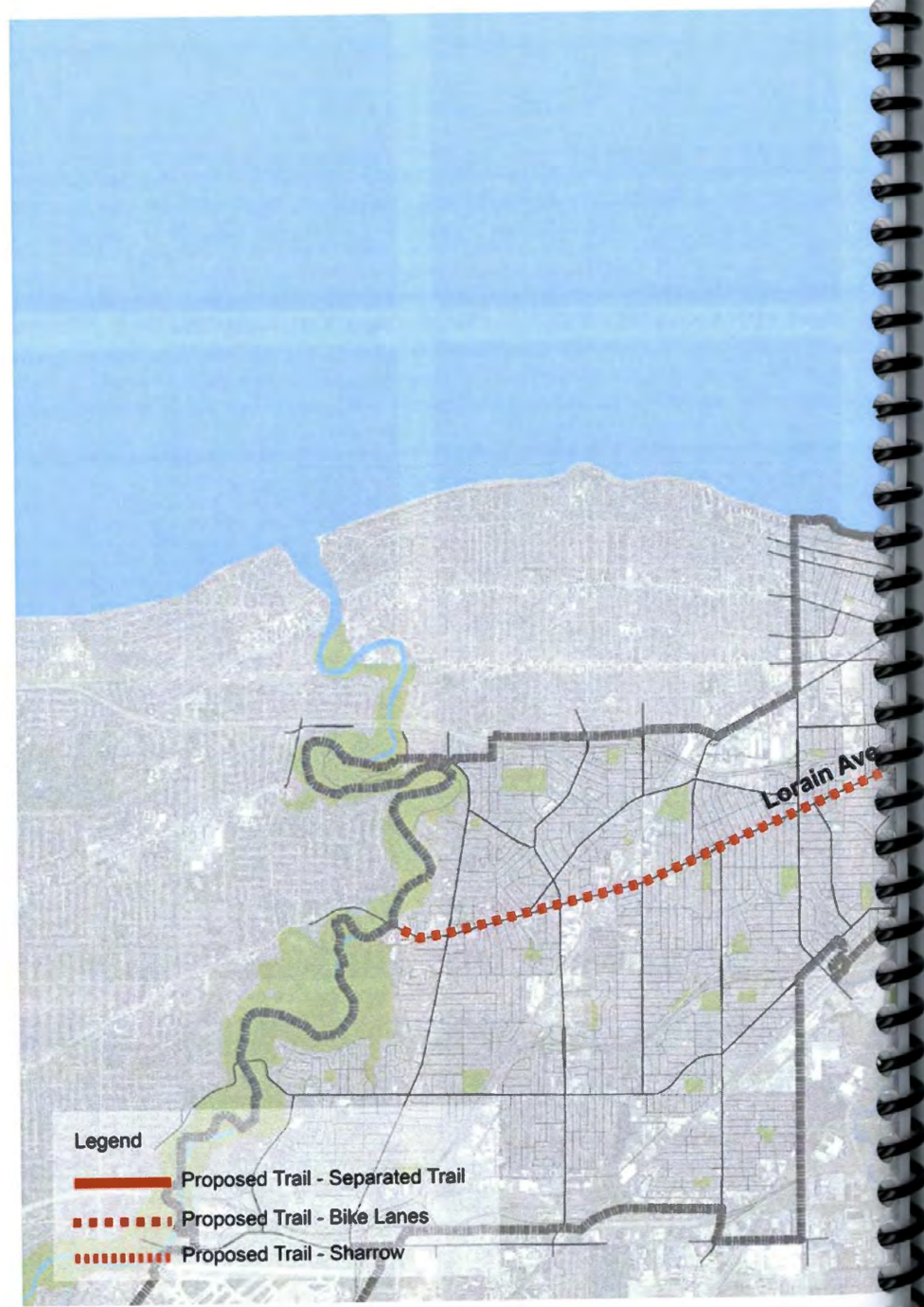
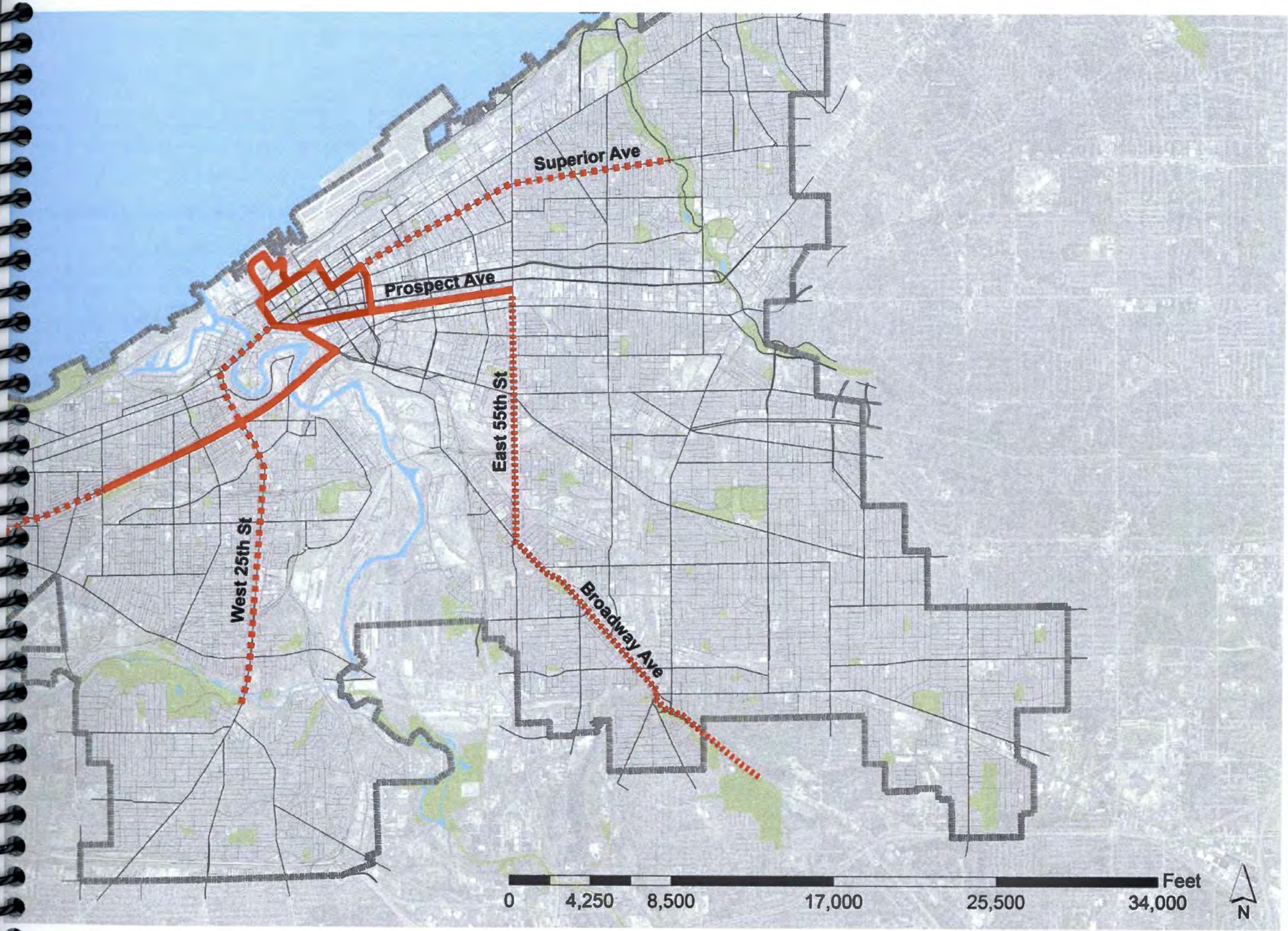


Figure 3.133: Full City Bicycle Framework Plan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Full City Bicycle Framework Plan - Interest Areas

01. Cleveland Metroparks Valley Parkway
02. Fairview Hospital
03. St. Ignatius High School
04. Michael Zone Recreation Center Park
05. West Side Market
06. MetroHealth
07. Cleveland Metroparks Zoo
08. Morgana Athletic Fields
09. Mill Creek Falls
10. Martin Luther King Jr. Drive Cultural Gardens
11. Garfield Park Reservation

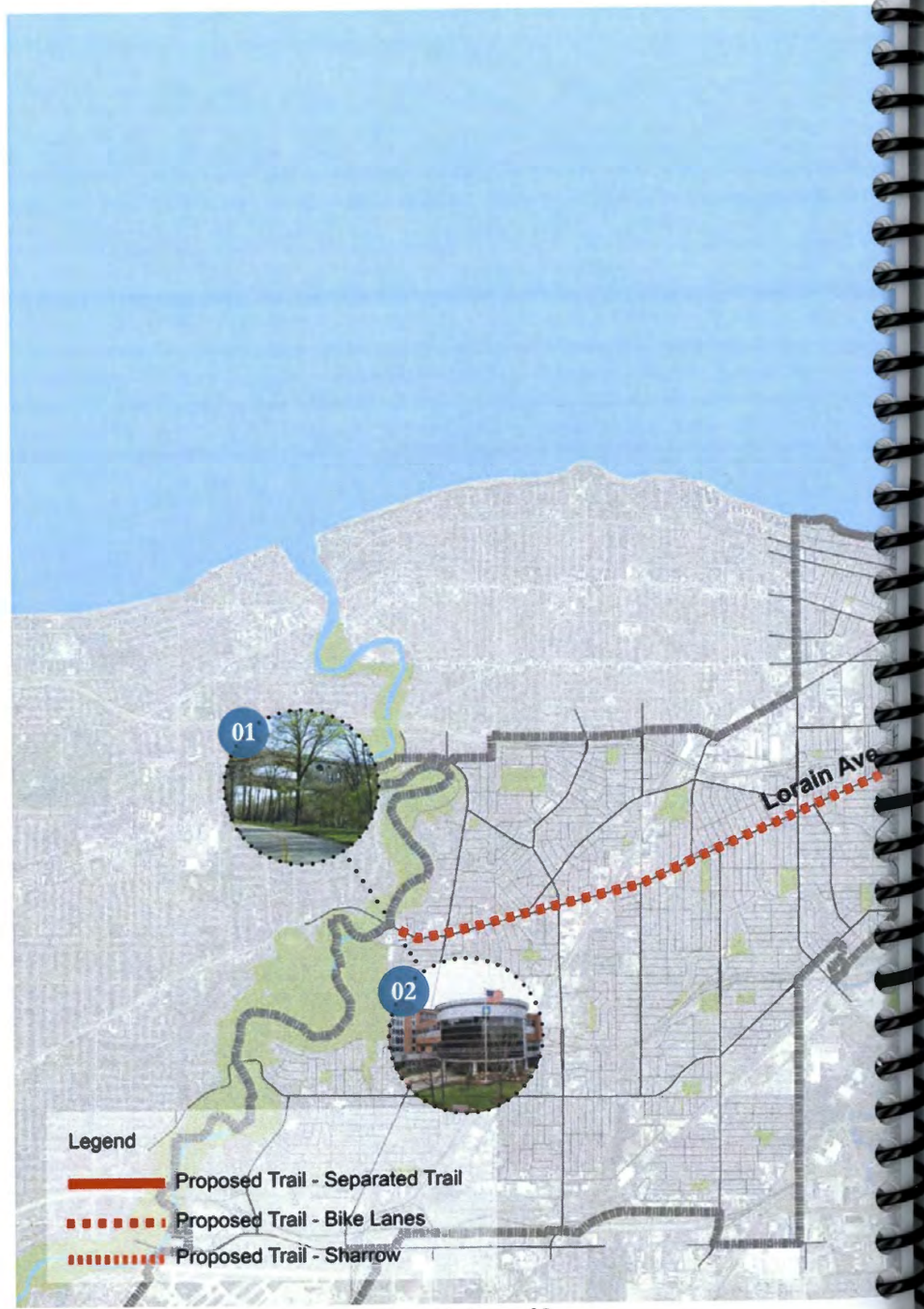
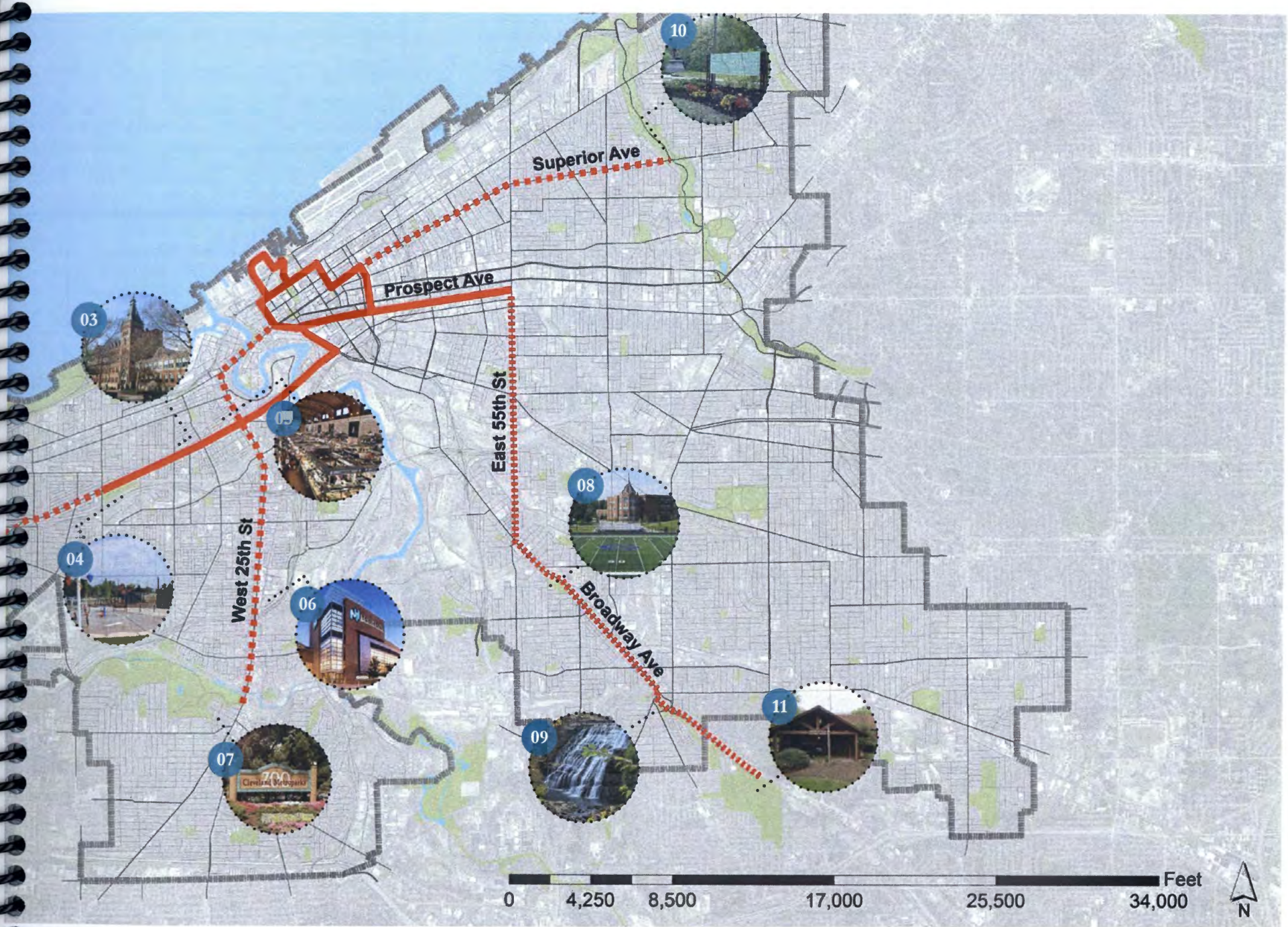


Figure 3.134: Full City Bicycle Framework Plan with Areas of Interest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Full City Bicycle Framework Plan - Connecting Transit

The overall city framework plan connects to several Cleveland RTA bus routes and other transit lines, allowing people living in other neighborhoods to gain easy access to the downtown bicycle and pedestrian trail loop. This access then begins to create a greater alternative transportation system for the City of Cleveland, leading to a holistic approach to the network system.

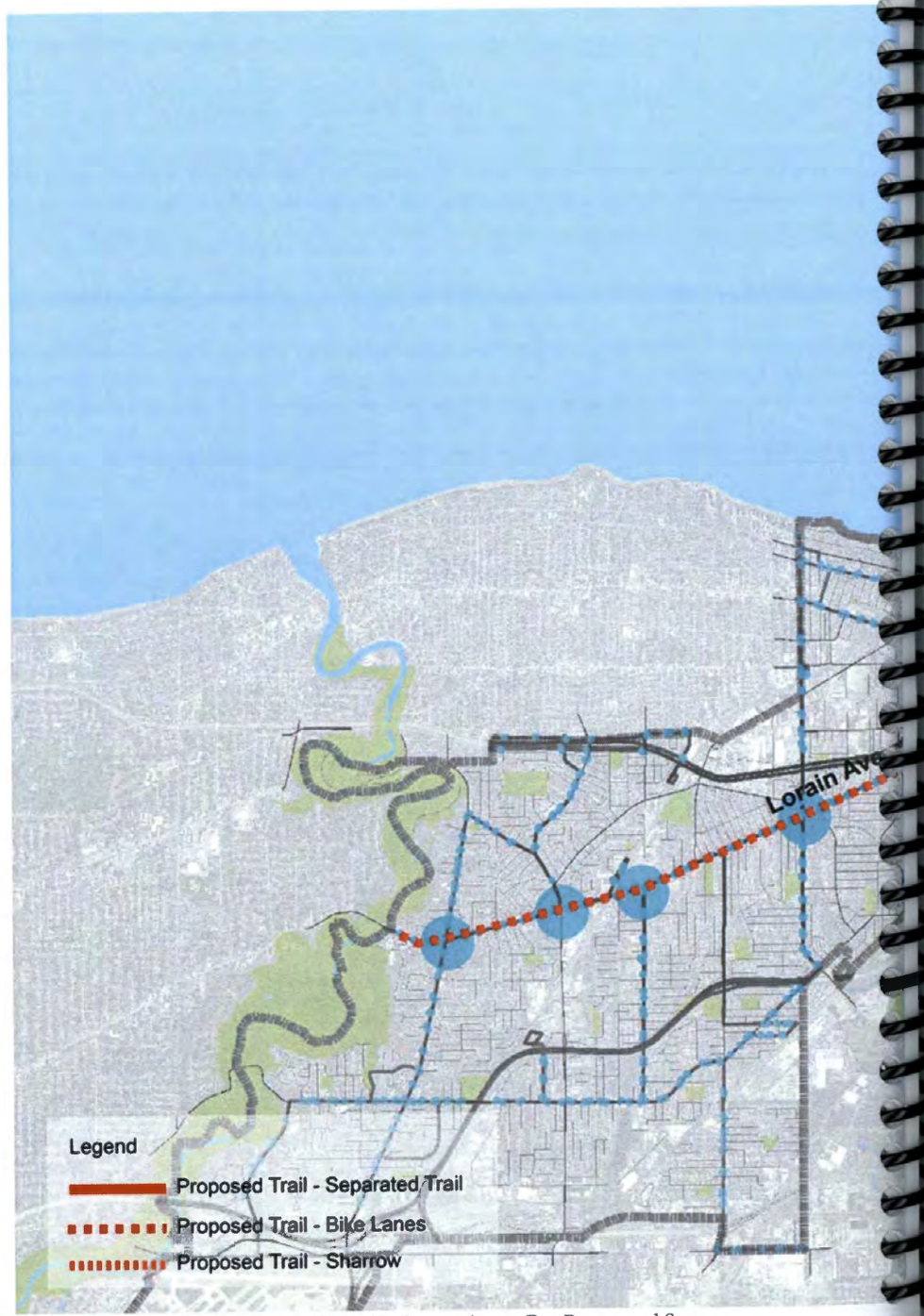
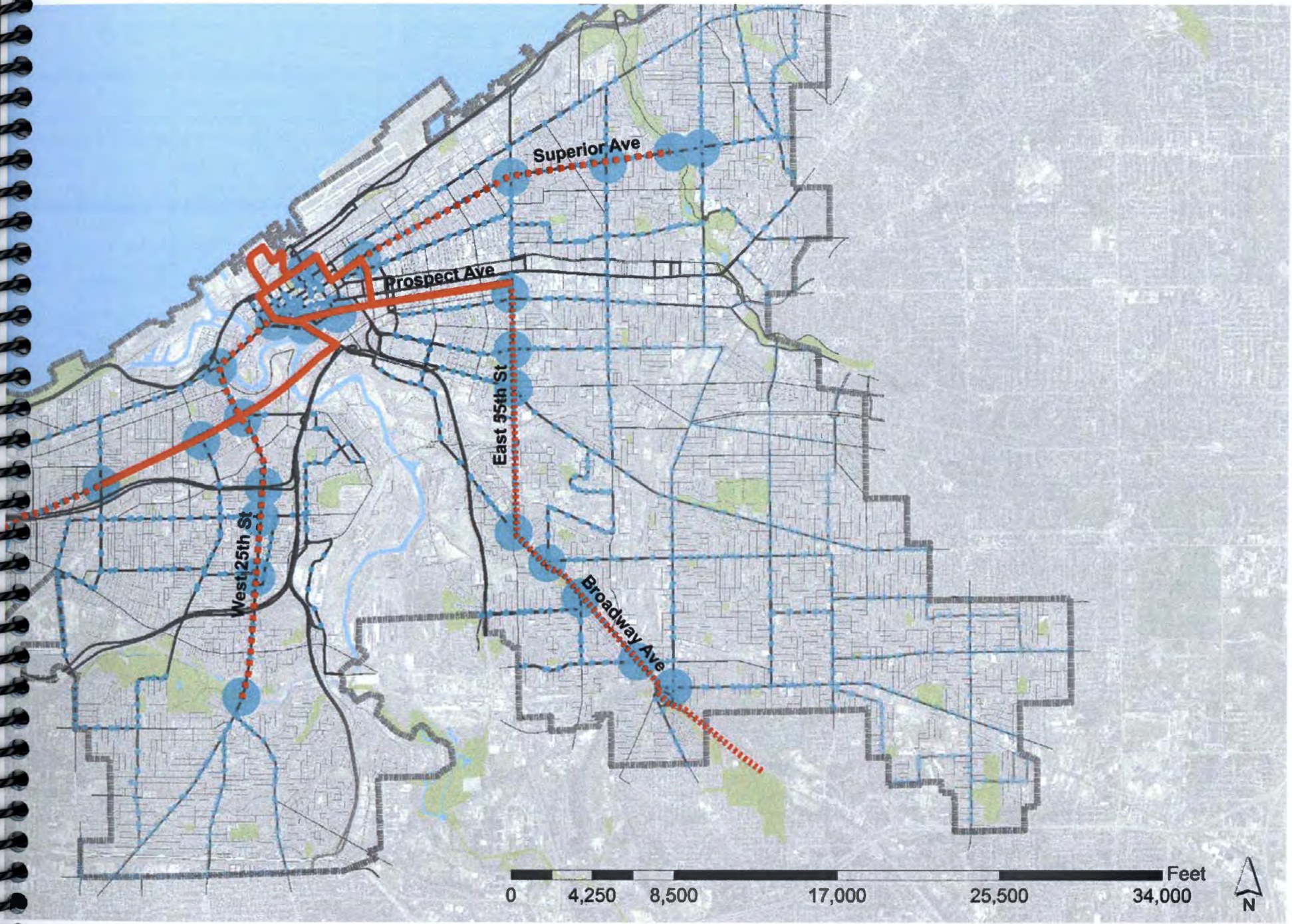


Figure 3.135: Full City Framework Plan with Connection to Bus Routes and Stops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Full City Bicycle Framework Plan - Connecting Trails

The connection to trails throughout the City of Cleveland enhances the areas bicycle infrastructure network and allows for a greater number of individuals to use the system. The presence of multi-use trails, bike lanes, and sharrows caters to a diverse audience, allowing people to enjoy fitness activities and use cycling as a transportation means. The proposed city and downtown framework plane begins to create a connected system aimed at serving the greater population.

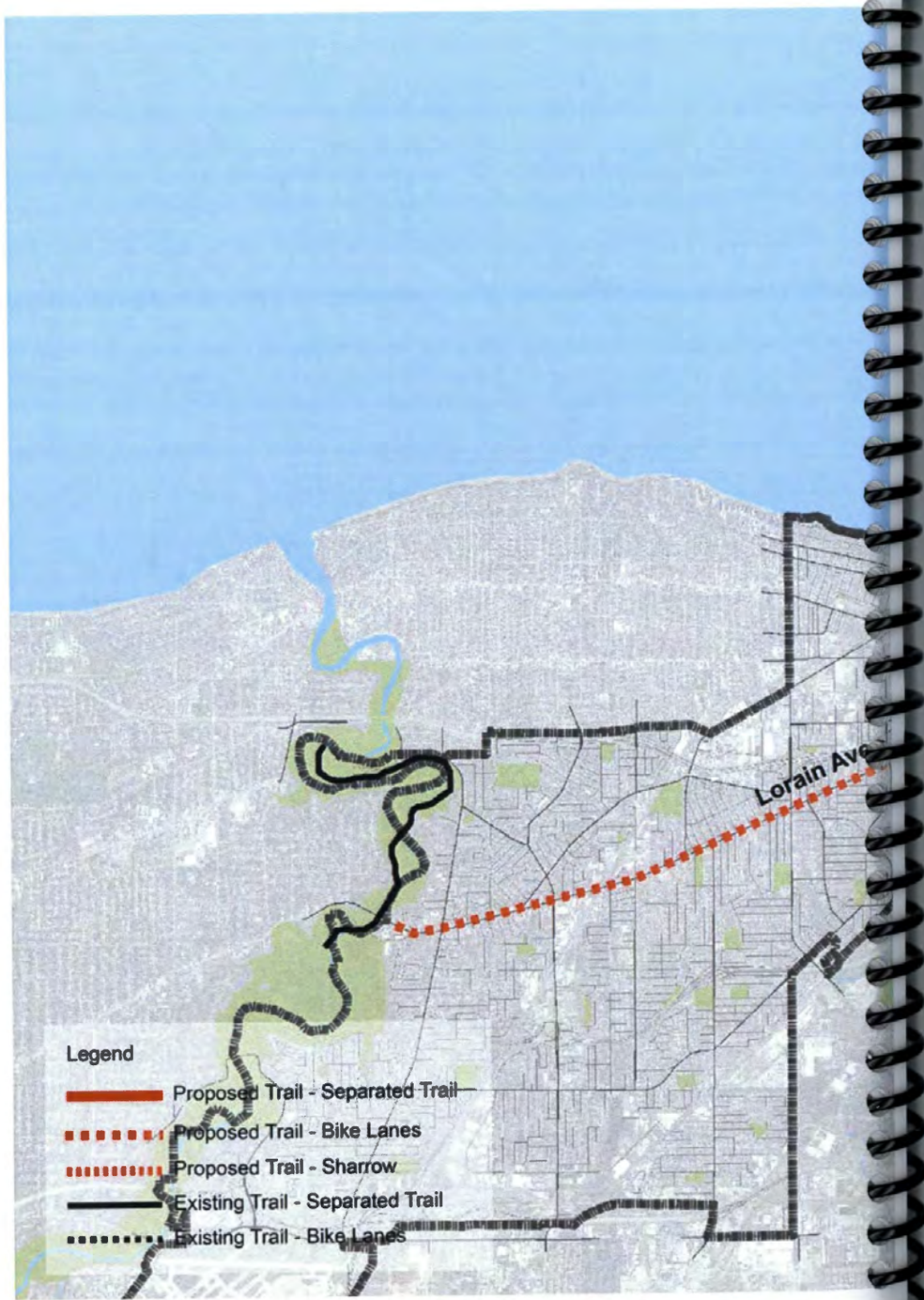
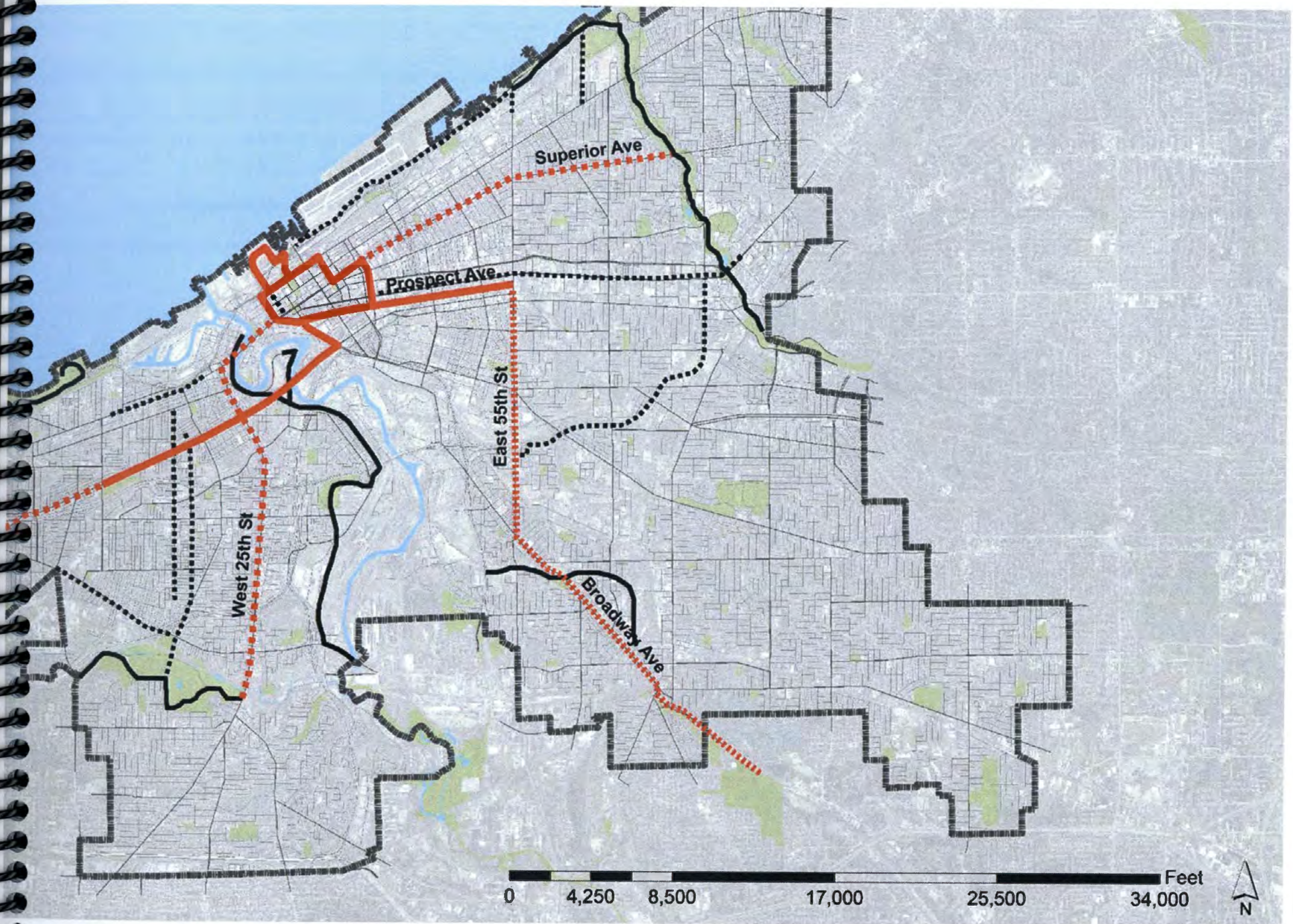


Figure 3.136: Full City Framework Plan Connection to Present Trail Amenities.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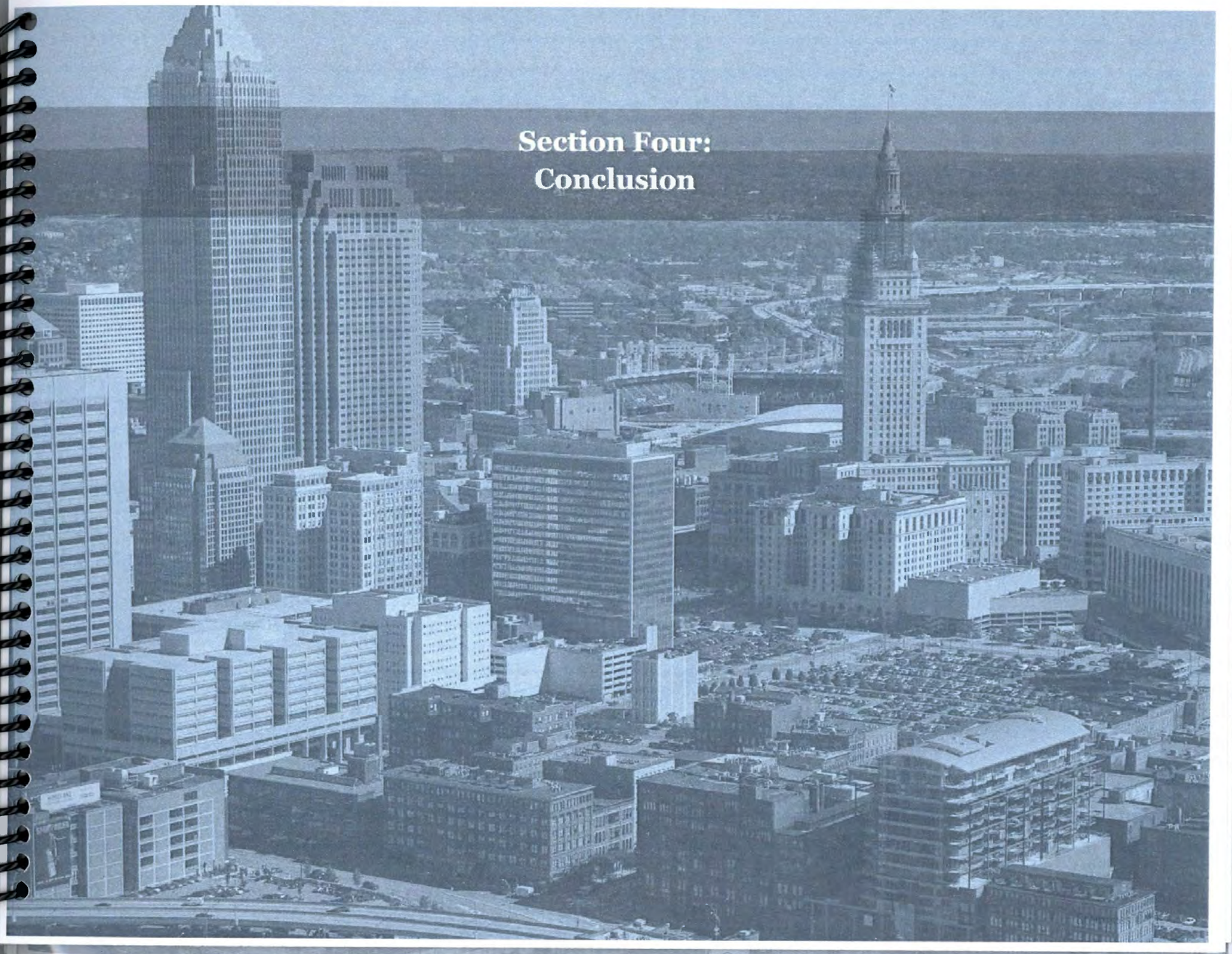


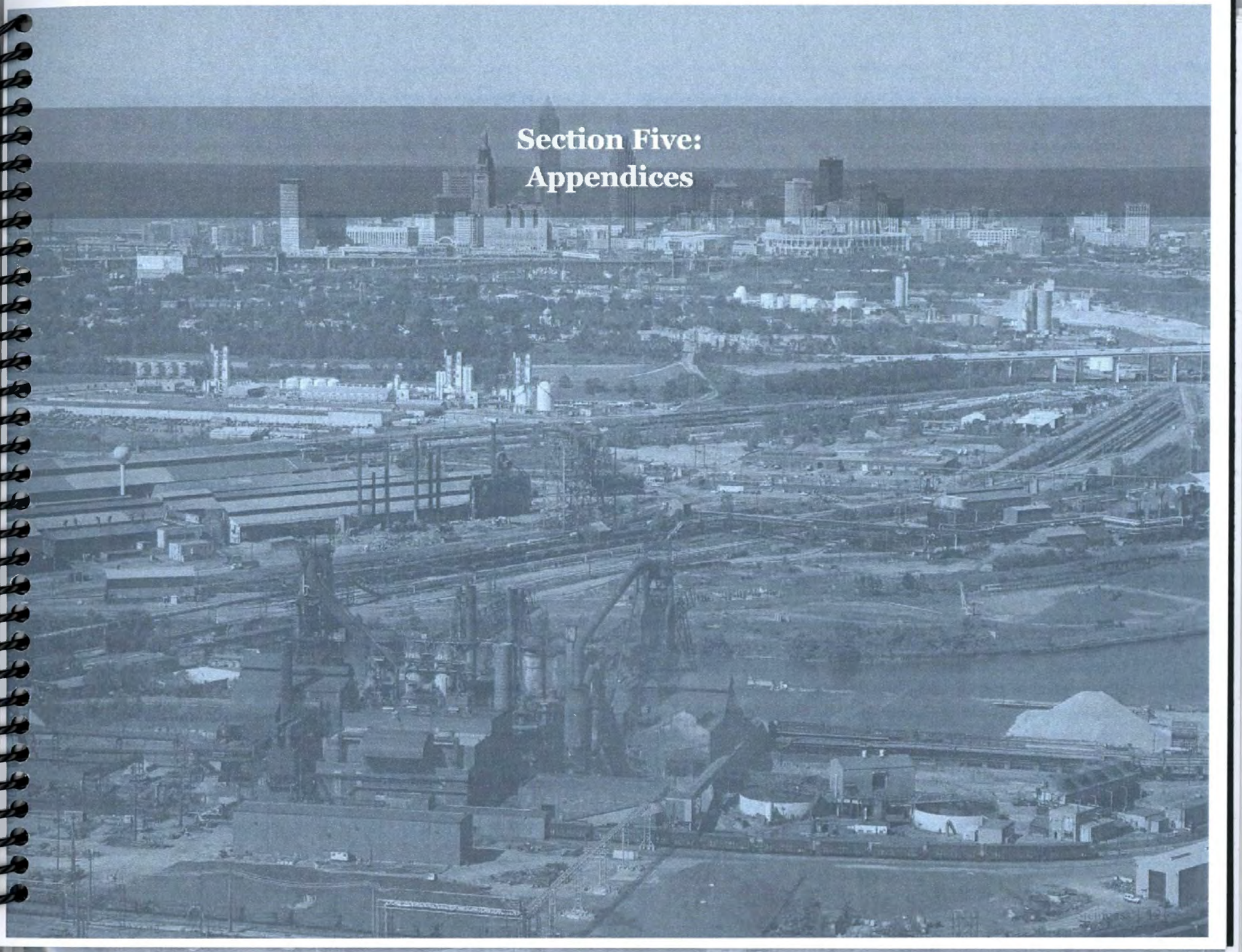
Section Four:
Conclusion

Conclusion

As the needs of the people constantly change, our urban landscape must continue to evolve to meet the population's demands. While the activity of the downtown core once revolved around the business model, it now needs to function towards a live, work, and play lifestyle. Demand for bicycle infrastructure and alternative transportation has risen in recent decades and this need will only continue to do so as urban populations increase. The street can no longer serve solely the automobile; it must now serve as a multi-functional landscape that can ensure the safety of pedestrians, cyclists, and motorists.

Through careful analysis and the implementation of design guidelines, this comprehensive project aimed to examine the challenges and process of creating an urban bicycle and pedestrian trail loop in the City of Cleveland, Ohio. Careful design of this trail loop allows for the connection of communities, enhancement of public right-of-way safety, provision of recreational opportunity, and promotion of economic development. Successful completion of these goals helps foster a sense of community while better connecting residents and visitors to local landmarks, amenities, and destinations. The successful implementation of this project helps to forward like initiatives in the City of Cleveland and could potentially serve as a model for future urban design and landscape planning with similar situated cities in the United States.

While the outcome of this project accomplishes the goals set prior to the design stage, further inquiry into this subject would be able to help further the success of the project if implemented. Overall, this project primarily focuses on the designed trail itself; however, the inclusion of designed nodes aimed at foster the growth of the bike-share program and bicycle facilities would help to further establish a cycling culture. Additionally, potential development sites along the trail could be analyzed in order to promote growth in amenities that are lacking along the trail elsewhere. This would create a more holistic development approach along the corridors that intersect the trail loop. Overall, the project serves as indication of what is possible for the future of Cleveland.



Section Five:
Appendices

Glossary of Terms

Alternative Transportation: is the collection of transportation systems outside of the traditional automobile; including pedestrian, commuter rail, bus, and bicycle networks

Bicycle Infrastructure: are the fundamental systems, networks, structures, facilities needed to support and promote a cycling culture; including roads, bridges, bike lanes, cycle tracks, sidewalks, trails, signage, bike racks, and traffic signals.

Bike Box: is a designated area at the head of traffic lane signalized intersection that provides cyclists with a safe and visible alternative to get in front of waiting motor vehicles.

Bike Lane: is a linear space designated for bicyclists through the use of pavement markings, located adjacent to and traveling with motor vehicle traffic.

Bike Share Program: is a common service or industry in which bicycles are made available for shared-use to individuals on short term basis for short point-to-point trips. These services often require a small fee and are most commonly found in heavily urbanized locations. The bike share program located in Cleveland is operated by Zagster.

Cleveland City Planning Commission: is a governmental body consisting of seven individuals that are charged with preparing and approving plans to guide development and project improvements throughout the City of Cleveland. This commission is supported by an internal staff of city planners, neighborhood planners, landscape architects, and architects.

Confirmation Signage: are signs intended to inform bicyclists of the designated bike path they are currently one. These signs do not include arrows; however, they are able to include items such as length of route or distance traveled.

Decision Signage: are signs that mark the intersection of two or more bike paths in order to inform the user of the designated bike route needed to access the desired destination. These signs can include arrows, length of route, distance traveled, or destinations.

District: is an artificial geographic area or sub-neighborhood within the downtown neighborhood in the City of Cleveland. There are eleven downtown districts: Avenue District, Burke Lakefront Airport, Campus District, Civic Center, the Flats, Gateway District, Nine-Twelve District, North Coast Harbor, Playhouse Square, Tower City District, and the Warehouse District.

Family Bicyclist: is an experience-oriented user that utilizes bicycle routes primarily for their scenic quality and amenities. These users typically only ride in a large group setting and only utilize a safe and well-established bicycle infrastructure network.

Fitness Bicyclist: is an exercise-oriented user that frequently utilizes bicycle routes primarily for self-fulfillment and health improvement. These users typically ride alone and will either use a well or poorly established bicycle infrastructure network.

HAWK Beacon (High-Intensity Activated Crosswalk Beacon): is a traffic control device used to allow the safe passage of pedestrians across a roadway, usually at a non-intersection location.

Health-Physical Recreation: is the intention of using recreational activities for their fitness and health benefits rather than their experiential, luxurious, or satisfactory qualities.

Institute of Transportation Engineers: is an international educational and scientific association of traffic and transportation engineers and similar professions who are responsible for meeting safety and mobility needs through the use of technology, research, policy development, planning, and design.

Island Refuge: is a protected space located in the center of the street that helps facilitate bicycle and pedestrian crossings by allowing these two user groups to navigate only one direction of motor traffic at a time.

Major Urban Street: is a primary artery that fosters heavy traffic, contains more than two lanes, and connects several key features over a large area or several districts.

Minor Urban Street: is a secondary or residential street that contains two lanes or less and experiences significantly less traffic flow than a major urban street.

National Association of City Transportation Officials: is a non-profit association that facilitates the exchange of transportation ideas and best practices in order to represent large cities on transportation issues of local, regional, and national scale and significance.

Neighborhood: is a community within a city that is formed not only due to geographic constraints, but also due to a common culture, economic status, urban identity, or other similar experience or custom. The City of Cleveland is composed of approximately 30 neighborhoods.

One-Way Cycle Track: is a linear one-way bikeway at street level that utilizes various methods to ensure physical and psychological protection for cyclists from passing traffic.

Physical Safety Threat: is the actual and potential for physical harm to bicyclists and pedestrians due to the automobile-pedestrian, automobile-bicyclists, and bicyclist-pedestrian conflict.

Pleasure Recreation: is the intention of using recreational activities for their experiential, luxurious, or satisfactory qualities rather than their health or physical fitness benefits.

Predictive Modeling: is a study that uses spatial qualities and statistics to state that occurrences of events or factors are not random in distribution; however, spatial environmental factors (such as infrastructure, economic factors, etc.) constrain and influence locations in which events are likely to occur and develop. This process allows data trends to be displayed in order to help dictate a favorable outcome. When confined to spatial qualities, predictive modeling is also referred to as predictive analysis or geospatial predictive modeling.

Protected Intersection: is a design concept aimed at protecting bicyclists and pedestrians at roadway intersections and to limit confusion and injury caused to individuals as a result of the right turn conflict.

Psychological Safety Threat: is the perceived threat to pedestrian or bicyclist safety due to the presence of automobiles or other streetscape features that create an unfair match in a theoretical conflict with these streetscape users. This threat can be present even when features such as buffers and warning signals are present along the trail.

Rails-to-Trails (Trails-from-Rails): are trail system and linear public spaces that where created from unused or abandoned rail corridors.

Raised Cycle Track: is a linear bikeway that utilizes vertical separation to ensure physical and psychological protection for cyclists from passing traffic.

Recreational Bicyclist: is a pleasure-oriented user that utilizes bicycle infrastructure for its experiential qualities. These users may either ride alone or in a small group, seek a variety of trail experiences, and will utilize amenities alongside the trail.

Right-of-Way: is public land that contains roads, utilities, sidewalks and other devices that can be utilized for transportation and are necessary for economic productivity.

Right Turn Conflict: is the uneven interaction between automobiles that desire to turn right and bicyclist at an intersection. Most bicycle master plans place cyclists and pedestrians and the edge of the street and at intersections, preventing motorists from turning effectively at intersections or causing harm to bicyclists as a result of unaware drivers.

Road Diet: is the process of narrowing traveling lanes and reconfiguring the urban street in order to accommodate for bicycle infrastructure and enhanced pedestrian mobility.

Separated Trail: is a trail system that creates designated paths for each recreational type.

Shared-Use Trail: is a trail system that is designed to accommodate for multiple recreational and user types on the same path.

Sharrow: is a road marking used to dictate a preferred common lane to be shared by both bicycle and automobiles. This is also referred to as a shared lane marking.

Through Lane: is a design feature that attempts to position cyclists at a preferred location when approaching intersection. This design feature forces motorists who desire to turn right to cross the bike lane prior to approaching the intersection, thus limiting the effect of the right turn conflict.

Trail Flexibility: is the ability for a designed trail to accommodate for several types of recreational activity. This includes, but is not limited to, bicycling, jogging, long boarding, in-line skating, unicycling, or walking.

Trail-Oriented Development: is the concept of creating and promoting economic development and prosperity along bicycle and pedestrian trails.

Transitional Zone: is the underutilized, dissimilar, and disjointed space between two districts, two neighborhoods, or two focal points.

Transportation Bicyclist: is a destination-oriented user that frequently utilizes the bicycle as a form of transportation. These users typically ride alone and will often use roads unless a well-established bicycle infrastructure in convenient.

Turn Signage: are signs that indicated a change in direction on a bike route from one street to another. These signs include destinations and arrows.

Two-Way Cycle Track: is a linear two-way bikeway at street level that utilizes various methods to ensure physical and psychological protection for cyclists from passing traffic.

Urban Core: is the large urban area in which serves as the center of economic activity, causing communities to appear and develop around this business heavy area. In the City of Cleveland, the urban core refers to the downtown neighborhood and the eleven districts within this area.

Wayfinding: is the process of using spatial information to help direct and orient and individual through their surrounding environment.

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